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PITTONIA.

A Series of Botanical Papers

BY

EDWARD L. GREENE,

Associate Professor of Botany in the University of California,

BERKELEY, CALIFORNIA.

JULY—SEPTEMBER, 1891.

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A Series of Papers Relating to Botany and Botanists.

BY

EDWARD L. GREENE,

VOLUME II.

MISSOURI
BOTANICAL
GARDEN.

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Vegetative Characters of the Species of Cicuta.

The notes upon this genus which I published a half-year since[1] please me now in this only, that they contain an earnest and a needed protest against the merging of *C. maculata* and *C. Californica* in *C. virosa*. I also gave the real clew to the discriminating of our species; this, however, neither in my own language, nor as any discovery of mine. I cited Asa Gray, in the Torrey and Gray Flora; and he, I find, took his account of the root characters of the species directly from the elder De Candolle, whose phrases in the Prodromus he merely translated into English. My own observations, in the paper alluded to, had been about as well unwritten; for my remarks are misapplied. In other words, and more explicitly, the "*Cicuta virosa*" of my notes is far from being that species; nor is that which I have called "*C. Californica*" the plant of Gray, except in small part. It is chiefly the *Œnanthe sarmentosa*, var. *Californica;* but it is named in our Californian herbaria, and that apparently by Dr. Gray's own authority, "*Cicuta Californica.*" It is therefore this *Œnanthe* which is identified confidently enough with the *Helosciadium Californicum*, H. & A.

The summer season of the year now closing brought me favorable opportunities for examining the Cicutas of a large area of the West,—southern California, the mountains of Colorado, the elevated plains of Wyoming and Idaho, middle Montana, and after these the lake region of northern Idaho and the banks of the Yakima in Washington. At the same

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[1] Pittonia, i. 271.

time my meager knowledge of the subterranean organs in eastern species was fully supplemented by careful investigations and full reports (the latter comprising admirable specimens and drawings), made by two valued correspondents, the one in New England, the other in New York.

The fact is well recognized, or should be, by descriptive botanists, that in herbaceous plants of all kinds, characters of the roots or other subterranean organs are of the very best for specific distinctions. Those of pubescence, foliage, and to some extent, of the flower also, are less constant within specific limits than are the peculiarities of the root, when the root happens to have peculiarities, which is however by no means the rule in nature. Most commonly the roots, rhizomes, tubers and other such organs will be much the same throughout the whole group,—a long series of species, or even an entire genus.

In an order so extremely natural as that of the Umbelliferæ, in which the fruits are so similar that plants of the same carpology are sometimes placed in different genera in deference to merely vegetative differences, it would seem altogether unphilosophical to require of the fruit that it furnish specific characters; or, to assume that unless the supposed members of a genus can be distinguished carpologically the species is but one.

As regards the life-limit in the individual plant, the species of Cicuta seem to hold an intermediate place between biennials and perennials. The flowering and fruiting plant in all American species at least, is sustained in part by food stored away during the one or several years of immature existence. The repositories of this supply are rhizomes in some species, fascicled fleshy roots in others. In either case the individual plant dies root and all on having once flowered. But not as in *Sanicula Menziesii*;[1] for while that multiplies by seeds only, the cowbanes are all gemmiparous. While the development of the stalk and panicle is in progress, the crown of the

[1] Pittonia, i. 269.

root, or the rhizome, whichever it may be, puts forth one or more large buds which, before the parent stock is dead, have formed roots of their own, and are become independent plants. These offsets seem to require in many instances more than one season for their full growth ; perhaps often two or more ; but fructification is fatal to the plant in every case ; the offset plantlets alone surviving. In a true perennial the aerial stem alone dies after fruiting, not the rootstock nor the roots.

The main roots of Cicuta usually fleshy-enlarged, are fascicled at, or verticilled around the base of the root-axis when such axis is short and erect, or they proceed from the nether side of the rhizome, when the species are truly rhizomatous. In addition to the main roots which are found in plants of all ages, there is formed above them at flowering time a verticil of quite different ones. These, proceeding from the aerial stem at the point where it leaves the ground, subserve the double purpose of giving a prop to the tall and heavy-laden paniculate growth, and of drawing further nutriment from the soil at the time when that stored in the fleshier roots, or in the rhizome, as the case may be, is exhausted. I shall call them accessory roots ; for they are necessarily taken into account in the diagnosis of the species.

By the kind of characters now sufficiently indicated the species, in so far as they are known, appear susceptible of the following grouping, and separate definition :

* *Root-axis very short, nearly or quite erect, not enlarged ; its partitions crowded.*

÷ *Roots all alike, slender-fibrous.*

1. C. VIROSA, Linn. Sp. Pl. 255 : *Sium alterum*, Dod. Pempt. 579 : *Sium majus angustifolium* iv. Tabern. ed. 2, i. 193 : *Sium erucæ folio*, C. Bauh. Pin. 154 : *Sium aquaticum foliis multifidis longis serratis*, Moris. Hist. ii. 283 : *Cicuta aquatica Gesneri*, J. Bauh. Hist. iii. 175 : *Coriandrum cicuta*, Crantz, Stirp. Austr. 211 : *Cicutaria virosa*, Juss. Gen. 221 ;

C. aquatica, Lam. Encycl. ii. 2: *Cicuta virosa*, Crantz, Inst. ii. 136; Linn. Fl. Suec. ed. 2, 92, Fl. Lapp. ed 2, 75; S. F. Gray, Nat. Arr. 507; Host, Fl. Austr. i. 385; Spach, Phanerog. viii. 190; DC. Prodr. iv. 99; Ledeb. Fl. Ross. ii. 241; Baill. Hist. vii. 123.—In many of the books here cited will be found the evidence that, in this Old World type of *Cicuta* the roots are not differentiated into what I have called the main and the accessory. This being true of it, and there being no reason for thinking that we have in America any *Cicuta* with that root-character, I can not venture to follow those authors who have assigned to the species a habitation on our side of the Atlantic. I wait for evidence that such a plant is here. Future field studies made in those northern parts of the continent where it has been said to occur, may settle the question.

In default of both field knowledge and authentic specimens of *C. virosa* I have made a somewhat extended and thorough library study of it. I regret that I have not had access to such works as the Flora Danica in which one might hope to see portrayed distinctly the subterranean organs of such a long known and rather notorious herb as the Cowbane. But the works both illustrated and merely descriptive which have been consulted are numerous, far beyond what the bibliography above given would indicate; and the result is an apparently well grounded conviction that the species in question is, what none of the American cowbanes can well be called, an aquatic; and, what is of more importance, that it has none other than slender-fibrous roots; these all proceeding not from a proper rhizome, but from the short nearly erect subterranean base of the stem. I shall here take the freedom of quoting some of the authors, beginning with one who wrote more than three centuries ago, namely Dodonæus (1585, or earlier).[1] The altogether fibrous and consimilar

[1] These ancient authors, to whom the name of botanists is not always conceded (we are wont to call them "herbalists"), were students of nature after the only safe method. They were workers along the lines which lead to accurate knowledge. They studied the *entire plant*, the consideration of *every part* of which is often declared to be the founda-

character of the roots he expresses thus: "Radix multis fibris fundo adhæret." And how pointedly this description excludes the twofold root-character found in the American species may be seen by reading the paragraph next preceding. The subject there is the plant known to us as *Sium cicutæfolium*; and he not only attributes to that the two kinds of roots found in many bog umbellifers, but describes the peculiar offices of the accessories.[1] Tabernæmontanus (1588) shows the roots of *C. virosa* to be altogether fibrous; Morison (1699), a specialist in Umbelliferæ, does not describe their form, but remarks that the root dies when once the plant has matured its fruit. Seeing he does not mention any proliferous method of propagation, he leaves it to be inferred that the plant is no more than an annual or biennial. Philip Miller in the eighth edition of the Dictionary (1768) without describing the form of the roots states that the plant grows only in considerable depth of stagnant water, and implies that it does not propagate except by seeds. Linnæus gives in the Flora Lapponica a very full account of the plant in general, without naming the root at all; but in the Flora Suecica he tells us that in the early spring of the year 1744, roots of this cowbane were brought to him for identification as being those of a plant which had caused the death of cattle that had eaten them as they lay denudated on a certain shore. He says some of them were planted in the botanic garden, where they freely propagated. And this looks as if the species might be gemmiparous. One of the most satisfactory

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tion on which the Natural System of Classification is to be built. It is true they had not come to a due appreciation of the importance of carpology; but our fault seems to have become that of carrying carpology to an extreme verging close upon abuse. Were the old "herbalists" to revisit our sphere, might they not regard us as a set of mere *herbarists* engaged in only half successful efforts to perfect our plant-knowledge, and reduce the vegetable kingdom to order, from dry and lifeless and only fragmentary materials?

[1] Radices tenues, nigræ et capillacei veluti fibræ sunt, quæ non modo subsunt; sed et caulium geniculis adnascuntur, iis quibus aquis conduntur aut limo infinguntur partibus. Dod. (De Sio), Pempt. 578.

of European local floras is Host's Austria (1827), and in this we find a concise and intelligible description of the subterranean organs of our plant; although we have to take into consideration this, that the author wrote at a time when the distinction between root and subterranean stem had not yet been clearly drawn or generally received. This is his description: "Radix tuberosa, deformis, cava, dissepimentis intercepta, fibris plurimis firmata." The body of what he describes is plainly the cauliform root-axis; and the true roots are all fibrous. Bœrhaave, a hundred years before Host had described quite as well the root-axis in his phrase "Radix cauliformis."[1] Ledebour says distinctly: "Radicis fibris filiformibus," and to the same effect is Spach's description of the root; and his is the fullest and most minute of all. Lastly, in the Prodromus De Candolle places *C. virosa* in a group by itself on account of its slender-fibrous roots; the other two species[2] known to him being formed in a second group by reason of their having roots oblong in shape and tuberous-fleshy. It is clear that, unless we have in America some Cicuta the roots of which form a mere tuft of slender and almost filiform fibres, the name of *C. virosa* should be excluded from our flora.

++ *Main roots coarse, elongated, fleshy-fibrous.*

2. C. Bolanderi, Watson, Proc. Am. Acad. xi. 139; Bot. Calif. i 261; Coult. & Rose Revis. Umb. 130. Roots numerous (8 to 20), whorled around the broad base of a short-conical strictly erect axis, greatly elongated (4 to 7 inches), $\frac{1}{4}$ to $\frac{1}{2}$ inch thick above, tapering very gradually (*i. e.* slender-conical), whitish, when cut or broken exuding a copious deep yellow oily juice; accessories not apparent: stem stout, erect, 4 to 9 feet high, purplish below and very glaucous, paniculate from below the middle: flowers clear white, showy: radical leaves on petioles 2 feet long or more, the blade twice or thrice pinnate, small in proportion to the

[1] Bœrh. Hortus Academicus, 55.

[2] *C. maculata* and *C. bulbifera*.

size of the plant; leaflets narrowly lanceolate-acuminate, closely and sharply serrate, the almost spinulose tips of the teeth somewhat spreading.

A somewhat local species; but very plentiful about Teal Station in the midst of the Suisun Marsh, California, and also near Martinez on the opposite side of Suisun Bay, growing among tall reeds and sedges in a hard but coarse and loose sod, the roots and base of stem laved daily by the brackish tide-water. Doubtless this is the largest of the cicutas, seldom less than six feet high, often nearly ten; the stem not rarely two inches thick below.

3. C. OCCIDENTALIS. Roots fewer (3 to 10), clustered at the base of a more slender somewhat ascending axis, 3 to 5 inches long, often nearly $\frac{3}{4}$ inch thick above the middle and distinctly but slenderly fusiform, white, the oily exudation reddish; accessories manifest, often rather copious but coarse, fleshy with little woody fibre: stem stoutish, green, scarcely glaucous, 3 to 6 feet high, paniculate from toward the base: leaves bipinnate; leaflets 2 or 3 inches long, narrowly lanceolate, coarsely serrate; flowers of a dull greenish white, small and not showy.

Probably most of the specimens of what I here name as a new species will be found in the herbaria under *C. maculata*. The plant is common from the Rocky Mountains of Colorado to the Sierra Nevada in California, and may often have been collected. My specimens are, first: from wet grounds near Tehachapi, Kern Co., Calif. (24 June, 1889), the plants in flower only. The herbage is a little glaucous in these: the leaflets, often 4 inches long, are rather broadly lanceolate, coarsely and unequally and hardly serrately toothed: triangular-lanceolate scarious edged bracts subtend the umbellules, and also somewhat sparingly the umbel. I would not designate this as the type of the species, but may be permitted to call it forma *frondosa*. Bolander's number 6343 from the Mono Trail in the same general region of country, is much like this as far as known; but its broadest leaflets are

almost ovate and only 2 inches long. This, we know, is in the books as "*C. maculata*," which it most probably is not, in character or in fact. The second locality is Trinidad, Colorado, near the New Mexican line (17 July, 1889). The plants grew in moist clayey soil along the margin of a reservoir, the ultimate ramifications of the main roots reaching the level of the water. The leaflets here are narrower, their margins more evenly and serrately notched, the whole plant is of lower and more stocky growth than in the Tehachapi region, and is not perceptibly glaucous. The third habitat is two hundred miles north of Trinidad, at a more considerable elevation; along the rocky margins of the swift-flowing stream called Bear Creek (28 July, 1889). The leaves in these specimens are narrow, with serratures whose spinulose tips spread rather abruptly. The fruits, perhaps not quite mature, are notably smaller than in other specimens, whether from Colorado or elsewhere. Along an irrigating ditch at Laramie, Wyoming, I observed but did not collect a plant in all respects like that of the Bear Creek district. These plants of Colorado and Wyoming I place as the type of *C. occidentalis*. They agree among themselves, in root character most perfectly; in stem, foliage, and in floral character very well. The very different nature of the root forbids the referring of these plants to either *C. virosa* or *C. maculata*.

4. C. PURPURATA. Roots, numerous, fleshy and slender-conical, 4 or 5 inches long, $\frac{1}{4}$ to $\frac{1}{3}$ inch thick at summit, emitting fibrous branches throughout; accessories as numerous, as long, but slender almost to the filiform, rather tough-fibrous: stem purple, glaucous, conspicuously striate, 3 to 4 feet high, paniculate from the middle: leaves bipinnate; leaflets ovate-lanceolate, an inch or two long, closely and often deeply serrate, the teeth a little falcate: umbels many, long-pedunculed, and like the umbellules bractless or the bracts deciduous: flowers dull and inconspicuous: fruit orbicular; ribs of the carpel broad and low; oil-tubes small.

Springy and boggy places along the Yakima River, near

Clealum, Washington, 14 August, 1889. On account of the general similarity of root characters in this and the preceding I had, while in the field, taken them for varieties of one species; but in the herbarium I can not bring them together. Over and above the beautifully purple stem, the peculiar serration of the leaves and also a certain minute reticulation of them, the fruit is quite unlike that of *C. occidentalis*. The *Sium ? Douglasii* of De Candolle is doubtless a *Cicuta*, and, it seems to me not improbably this very species. It has been the custom to dispose of it as a synonym of *C. maculata*; but its habitat lies far beyond the most westerly authenticated range of that species.

+ + + *Main roots oval or oblong, fleshy-tuberiform.*

5. C. MACULATA. Linn., Sp. Pl. 256. Roots 5 to 10, oblong, tuber-like, an inch or two long; accessories innumerable. slender-fibrous, forming a dense tuft.

Eastern and Middle States of America, apparently not ranging much westward of the region of the Great Lakes. Root-axis very short and erect, and, with the whole stem, of only half the thickness and more than equal height of those of the far western plants which have been referred to it. Flowers white and showy, not, as in the western analogue, dull and inconspicuous.

6. C. BULBIFERA, Linn. l. c. 255. Tuberiform roots, apparently only 2 or 3, oval or more rounded, ½ to 1 inch long, decaying early; replaced by both fine and coarse accessories, some of these greatly elongated and tough woody-fibrous.

Same range as the last; the basal gemmiparism of other species being here carried up to the branches and branchlets.

* * *Rhizomatous species: the root-axis greatly enlarged, horizontal, only partly or not at all subterranean, emitting fibrous roots from beneath.*

7. C. VAGANS. Rhizome simple, cylindrical, close-jointed, 3 to 6 inches long and an inch or two in diameter, green

exteriorly, white or yellowish within, yielding abundantly the usual reddish oil : stem branched from the very base, the branches diffuse or reclining, 3 to 5 feet long, abundantly floriferous ; herbage purplish and glaucous : radical leaves 2 feet long, bi- or tripinnate : leaflets 2 inches long, lanceolate, somewhat cuneate below and entire, but from below the middle bearing rather remote short but salient serrate teeth : flowers dull : fruit orbicular : the ribs very broad and low, the oil-tubes small ; cross-section of seed nearly reniform.

Growing among driftwood in an estuary of Lake Pend d'Oreille, Idaho Territory, 9 August, 1889. The flower and fruit much as in *C. purpurata*, but in root character very different, as also in mode of growth, the stout long straggling and somewhat flexuous branches spreading over an area of six or eight feet. The parent rhizome being exhausted and in an advanced stage of decay at fruiting time, the plant was sustained and supported by large and long tough-fibrous accessories. At the same time the several young offsets at the base were well grown, and furnished the leaves from which the description is drawn.

I refer here, but somewhat doubtfully, the plant of the marshes in Modoc County, California, to which reference is made in the first volume of these papers under the name *C. virosa*. I consider it possible that the name *Sium Douglasii* may belong to this plant ; but whether to this, or to *C. purpurata*, or to some other species different from both, it may be forever impossible to determine. Nor should I be surprised greatly if the Mono County plant of Bolander, referred to under *C. occidentalis*, were found to exhibit the root-characters of the present species, and became referable to it. It has much the same kind of fruit.

8. C. Californica, Gray, Proc. Am. Acad. vii. 344; *C. virosa*, var. *Californica*, Coult. & Rose. Revis. Umb. 130. Rhizome freely branching, the branches 6 inches to a foot long, a half-inch or more in thickness below, where the internodes are two or three inches long, above (under the aerial

stem), abruptly clavate-enlarged and close-jointed; the joints emitting from beneath very coarse cylindrical fibrous roots.

This singular species is of peculiar habitat, being apparently restricted to the redwood belt, in California, where it grows along the margins of eddies and in shallow waters of the shaded mountain streamlets. It is almost an aquatic; and we have no other species which is so. The stems are tall and strictly erect, and the branched and cespitose slender and abruptly clavate rhizomes furnish a most incontrovertible specific character.

The Genus Lythrum in California.

In the Botany of the State Survey, the only work we have claiming to set forth the botany of the entire State, we are credited with one species of *Lythrum*. I have long recognized the presence with us of three very good ones; and the recent appearance in my herbarium of a fourth, which the first glance reveals as a new one, has led to a critical study of all the specimens. The result may be indicated as follows:

* *Annual.*

1. L. Hyssopifolia, Linn. Sp. Pl. 447. This widely disseminated, but small, homely and obscurely lurking annual was collected by the writer near Calistoga, Napa Co., as long ago as the year 1874. We neither saw nor heard anything more of it as a Californian plant until 1888, when we obtained it again at Calistoga, and also in the county of Sonoma, adjoining Napa, but whether near Santa Rosa or Petaluma the tickets do not show, and our memory does not warrant a more definite statement about this second Pacific coast locality. But the plant is here, though doubtless as elsewhere both in Europe and America, something of a rarity.

** *Stoloniferous perennials ; roots all fibrous and superficial.*

2. L. ADSURGENS. Stems from 8 inches to a yard long, 5-wing-angled, stoutish but tough and flexible, decumbent or nearly prostrate, the spicate branches assurgent or nearly erect: herbage pallid, glabrous, a little succulent: leaves alternate, linear, sessile, in age revolute: corolla minute, pale purple or almost white: calyx $2\frac{1}{2}$ lines long, 12-striate, in maturity the striæ all widened and thicker at the base; teeth minute, subulate, the intermediate processes broad, low, mucronulate.

Plentiful in low meadow lands adjacent to the salt marshes of San Francisco Bay, especially about West Berkeley, flowering early and late. The minute pale flowers, pallor of herbage, and even the characteristics of the calyx indicate close relationship to the annual *L. Hyssopifolia*. The flowers are even smaller than in that species. It is clearly distinct, not only by its perennial root, stoloniferous crown, and coarse nearly prostrate stems; the stems are 5-angled and all the leaves alternate.

3. L. CALIFORNICUM, Torr. & Gray, Fl. N. Am. i. 482. Common and widely dispersed in the State: readily known by its tall strictly erect brittle stems and showy bright purple flowers on the terminal virgate branches. The striæ of the calyx are alike above and below; its teeth shorter than in the two preceding. It inhabits moist springy places among the hills and mountains, but not in such localities exclusively; it is abundant and of rank growth in the brackish marshes of Suisun Bay.

*** *Perennial from deep-seated coarse black roots or root-stocks; not stoloniferous.*

4. L. SANFORDI. Stems a foot or two high, erect, branched from near the base, acutely 5- or 6-angled: herbage deep green, glabrous: leaves all alternate, linear-oblong, sessile:

petals 6, showy, bright purple: calyx minutely and sharply 12-carinate; teeth short, triangular, the intervening processes nearly equalling them.

Abundant in rich alluvial fields on the lower San Joaquin River, particularly about Stockton. where, on account of its deep and ineradicable underground growth. it is an unwelcome plant in fields and vineyards. I have my only specimen, and that one not yet well in flower, from a genial and very helpful correspondent, Mr. J. A. Sanford, to whom I am glad to be able to dedicate a species with excellent characters, and at the same time far from unsightly. The coarse greatly elongated and tortuous horizontally running roots, if reached by the plough and cut asunder, give rise to new individuals: hence some measure of its troublesomeness to farmers and fruit-growers.

New or Noteworthy Species.

VI.

Platystemon crinitus. Subacaulescent, the foliage, scapiform peduncles, and the calyx densely crinite-hirsute with white soft spreading hairs 3 or 4 lines long: flower buds exactly globose: corolla an inch broad, the petals deep greenish yellow, marcescent-persistent: stamens innumerable: filaments widely dilated: carpels many, the short torulose pods scarcely longer than the persistent linear stigmas.

Mountains south of Tehachapi, Kern Co., California, 24 June, 1889. A beautiful plant, much less branching than *P. Californicus* and whose pubescence alone (not to insist on the value of the color and marcescence of the petals, form of buds, different habit, etc.) marks it as distinct from that common

and even variable species. The pubescence of *P. Californicus*, always sparse, is coarse and stiff, *i. e.* nearer to the hispid than to the villous, and is not white. The buds in that species are unvaryingly obovate, and their pods of twice or thrice the length of the stigmas.

VIOLA PINETORUM. Caulescent, the short stems tufted at the end of a slender nearly horizontal rootstock or root a foot long: flowering stems surpassed by the long-peduncled foliage: herbage cinereous-puberulent: leaves from oval to linear-lanceolate, the broader coarsely sinuate-toothed, the narrower nearly or quite entire, all tapering below to the slender elongated peduncle; stipules mostly scarious, lanceolate-acuminate, sparingly lacerate: flowers on long filiform peduncles, small, purplish or bluish.

Pine woods of the higher mountains south of Tehachapi, Kern Co., California, 25 June, 1889. A very interesting novelty, on account of its close affinity for *V. Nuttallii*, but having truly violet-colored petals; all other known species of the group being yellow-flowered. The plants were nearly out of bloom at the late date of their discovery, and were fruiting abundantly from apetalous and cleistogamous flowers; the capsules short-obovate, little exceeding the sepals.

VIOLA DOUGLASII, Steudel, Nom. ii. 771 (1841), is a name which ought to replace in our books and catalogues of West American botany the name *V. chrysantha* of Hooker, for this is antedated by the obscure and little known *V. chrysantha*, Schrader (in Reichenb. Ic. Exot. t. 114 (1834). Hooker's date (Ic. Pl. t. 49) is 1837. The homonym was repeated more recently for small-flowered annual species of South America; and this plant (*V. chrysantha*, Philippi, Linnæa, xxxiii. 15. (1864), may well take the name of V. PHILIPPIANA.

RHAMNUS RUBRA, Greene, Pitt. i. 68 and 160. Apparently Mr. Sonne was not the first botanical observer who, being familiar with *R. Californica*, was led to ask concerning the

shrub more recently named as new, "What is this?" While at the Calaveras Big Trees last June, my friend Mr. Belding, well known in zöological circles as a keen observer and scrupulously faithful reporter of phænomena, brought me one evening from beyond the Stanislaus a buckthorn twig, and said, "I should like to know what you call that?" I answered: "*Rhamnus rubra*, which I published as new not long ago." The answer satisfied him; and he then informed me that he had sent it to Dr. Kellogg a dozen years ago, and had received from him the name "*R. Californica*," which he was confident it could not be, for "the berries are red, and not unpalatable." The nauseating sweetness and slightly astringent taste of the inviting-looking large black fruits of *R. Californica* may be known to many a field naturalist. The character of "dark purple" for the berries of *R. rubra* I have probably derived from Mr. Somne's notes. In the extreme they are likely to be found dark red or red-purple.

Mr. Somne now assures me that he finds the seeds to be very commonly three in each berry; a mark which points to an affinity for *R. Purshiana*.

RHAMNUS OCCIDENTALIS, Howell in herb. Professor Trelease in his recent paper on the genus[1] makes reference to this as merely a "broad-leaved form" of *R. Californica*. The specimens distributed by Mr. Howell in 1887 did not convince me that he had a distinct species; but they had been gathered while the shrub was not yet out of flower, nor the leaves well matured. In a large lot of specimens gathered by the same collector this year at a later date, what I consider an indisputable specific character comes out strongly. I refer to the yellow coating of the lower face of the mature leaves; just like what one sees in *R. crocea*. The berries are black and 3-seeded; and this indicates close relationship to *R. Purshiana* rather than to *R. Californica*. In the form and texture of the foliage, as well as in its persistency, the species on the other hand approaches the one last named.

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[1] Trans. St. Louis Acad. v. 367.

CEANOTHUS CONNIVENS. A low shrub with elongated nearly simple, weak and flexible trailing branches 3 feet long or more, forming a depressed tuft: leaves opposite, coriaceous, cuneate-obovate to oblanceolate, an inch long or less, entire except at the truncate or retuse and mostly 3-toothed apex, glabrous and rugulose above, white-tomentulose between the veins and veinlets beneath: fruit in umbelliform clusters at the ends of short terminal branchlets, small, the conspicuous horns closely appressed to the surface of the exocarp, connivent and overlapping at the end of it.

Calaveras County, Calif., in dry oak woods near the Half-Way House between Murphy's and the Big Trees, 19 June, 1889. As a new member of the Cerastes section, exceedingly well marked in its fruit character, it has a flexibility of stem found in no other northern relative; although *C. verrucosus* of the table lands of southern California and of the peninsula is like it in this respect. But *C. connivens* is nearly prostrate through mere lack of firmness or hardness in wood-fibre. It however evinces none of the rooting and matted character of the not yet well described but most distinct *C. prostratus*.

Along the bleak summits of the Siskiyou Mountains of southern Oregon I observed in September a Ceanothus much like this in leaf character; the stems depressed but not prostrate, less flexible and stouter. In the absence of fruit one could not say whether it could be referred to this, or whether it would be a stunted growth of *C. cuneatus* with truncate and notched leaves. The zeal and diligence of Mr. Howell, who has easier access to the region indicated, it is to be hoped may settle the question by collecting it in fruit some day.

ASTER BRICKELLIOIDES. *Sericocarpus tomentellus*, Greene, Pitt. i. 283. Notwithstanding its coriaceous foliage, silky achenes, and an inflorescence so suggestive of *Sericocarpus*, it was not well to refer this plant to that genus. Although rayless, it must be rather closely connected with *Aster ledophyllus*, a plant which Dr. Gray at length placed in the rank

of a variety of *A. Engelmanni*. As a new *Aster*, I name it in reference to the likeness it bears, in several particulars, to certain Mexican species of *Brickellia*.

I have this year collected a plant which, in the face of a good deal of dissimilarity as regards form and texture and even the venation and pubescence of the leaves, I nevertheless place provisionally under *A. brickellioides*, as a variety GLABRATUS. Stems several, erect, 2 feet high, equably leafy up to the base of the many-flowered thyrsoid panicle: leaves oblong-lanceolate, acute, entire, triple-nerved at base, sessile, 2 inches long, not coriaceous, glabrous above, often sparingly roughish-pubescent beneath: involucre slightly tomentulose: bracts broader and thinner than in the type, acute; rays none; achenes hirsute.

Common among oak bushes (*Quercus Œrstediana*) toward the summits of the Siskiyou Mountains, Oregon, 3 Sept., 1889: therefore not far from the habitat of the type.

APLOPAPPUS BLOOMERI, var. SONNEI. Apparently depressed and diffusely branching: leaves linear-acerose, an inch long or more, and together with the branchlets and involucres, canescently flocculent: rays few (2 or 3, as in the type), large: pappus white (somewhat fulvous in the typical *A. Bloomeri*).

Sandy soil about Donner Lake in the Sierra Nevada, August, 1889, C. F. Sonne. If the individuals had been few I should have guessed the plants to be hybrids between *A. Bloomeri* and some one of the floccose species of *Bigelovia*. But Mr. Sonne reports it as plentiful, and well isolated from all Bigelovias.

APLOPAPPUS CRUENTUS. Shrubby and low, the stout divergent monocephalous branches very leafy and somewhat villous: leaves coriaceous, spatulate-obovate, an inch long or more, glabrous, not veiny, closely spinose-serrate: heads solitary, very large (more than an inch broad and nearly as high); involucre turbinate, the scales closely imbricate in

many series, their appressed tips green and glutinous: rays numerous, of a deep saffron-red: achenes 15-nerved; pappus of long and stiff not very copious unequal light-colored bristles.

On the largest of the Coronado Islands off the coast of Lower California, 3 June, 1889, collected by Lieutenant Charles F. Pond. A fine new species of Aplopappus proper, which, with its rich red rays, is less unsightly than its allies *A. squarrosus* and *A. Berberidis* of the adjacent mainland coasts.

GRINDELIA HENDERSONI. Short woody caudex. bearing short and stout divaricate branches; flowering stems erect, a foot high, sparsely hirsute: leaves (on sterile basal branchlets) 6 or 8 inches long; blade oblanceolate, closely dentate or serrate, tapering to a winged petiole of its own length: heads large, the involucral bracts squarrose and very glutinous: achenes neither angled nor striate, the terminal border low and entire; awns of the pappus 2 or 3, flattened and corneous, barbellate along the edges.

Dry rocky banks of Lummi Island, southern shore of the Gulf of Georgia, 5 July, 1888, Prof. L. F. Henderson (No. 1676). A very distinct species, with the suffrutescent habit of our Californian seashore plant, *G. cuneifolia;* pubescence more like that of *G. hirsutula*, the achenes and pappus peculiar.

PETASITES NIVALIS. Rootstocks slender, matted, scarcely subterranean: leaves 6 to 10 inches high; lamina 3 to 6 inches long, of round-reniform or broadly cordate-ovate outline, 5-parted, the sinuses oblong and closed, the segments of broadly cuneate-obovate circumscription, deeply 3- to 5-lobed, the lobes with a few coarse angular mucronate spreading teeth; lower face of leaves silky-tomentose, upper glabrous, deep green: scape about a foot high; heads a dozen or more, racemosely arranged and long-peduncled.

Abundant and forming a dense growth along streamlets fed

by melting snows about Crater Lake on Mt. Rainier; 20 August, 1889, in leaf and fruit only. The plant is so common and plentiful on the northward slope of the mountain above named, that I can hardly think it does not occur on other snowy mountains of Washington and Oregon. and that others may have collected it. I have even a suspicion that some of the "*P. palmata*" from the farther northwestern stations will be of the present very different species. The real *P. palmata* is a woodland plant, the stems of which grow singly, or very few together. *P. niralis* belongs exclusively to subalpine heights, where, along the margins of snow-banks and icy rivulets it forms a border of vegetation which, although low, is so compact that the traveler avoids it. *P. palmata* is very common in the woods that skirt the remoter bases of Rainier; and a long interval of distance as well as of altitude separates between it and the habitat of this which I am compelled to regard as hitherto undescribed. There is no species of either the New World or the Old to which is attributed a foliage so much divided and subdivided as that here described. The flowers are, of course, unknown. The station is probably inaccessible to travelers until after its flowering time is past. In August the fruit had evidently long since matured: only the dead stalks with their vacant involucres were remaining. After the low sedges and grasses, the most common associates of this *Petasites* were *Spiræa pectinata*, *Leptarrhena pyrolæfolia* and *Scorzonella borealis*.[1]

SENECIO FRANCISCANUS. Perennial. low, more or less cæspitose from running rootstocks: flowering stem 2 or 3 inches high, very leafy at base; lower leaves rounded and toothed, the upper lyrate-pinnatifid, all coriaceous. none more than an inch long, including the petiole: heads 1 to 5, large. subsessile, with few short but broad rays.

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[1] SCORZONELLA BOREALIS — *Apargia borealis*, Bong. Veg. Sitcha. 146; *Leontodon boreale*, DC. Prodr. vii. 102; *Apargidium*, Torr. & Gray Fl. ii. 474.—Ripe achenes of this plant, now for the first time obtained, leave no room for doubt that it belongs to Nuttall's genus *Scorzonella*

Volcanic rocky soil near the summit of Mt. San Francisco. in the northern part of Arizona, 10 July, 1889. Plentiful. but scarcely yet in flower at the date of its discovery. The altitude, little less than 12,000 feet; the only associate plant being *Polemonium confertum*, and that well past flowering.

Senecio ionophyllus. Perennial, a foot high or taller, somewhat floccose, or nearly glabrous: radical leaves crowded, somewhat fleshy, small ($\frac{3}{4}$ inch long), cordate-orbicular or even slightly reniform, coarsely crenate or dentate, on petioles 2 inches long; cauline narrower, more sharply toothed or even somewhat pinnatifid: heads large ($\frac{3}{3}$ inch high. $\frac{1}{2}$ inch broad), solitary, or more frequently 3 to 5 in a lax terminal corymb; bracts oblong-lanceolate, the calyculate few, imbedded in white tomentum: rays showy, light yellow: style-tips hirsute: achenes prismatic-fusiform.

Dry pine woods near the summit of the mountains south of Tehachapi, Kern Co., Calif., 25 June, 1889. A handsome species, the nearest relative of which may be *S. Greenei* of the Lake County hills.

Senecio Gibbonsii. Stem stout, simple, 3 feet high or taller, leafy throughout: leaves rather fleshy, short-petioled, 3 inches long, deltoid-lanceolate, acute, entire, or with a few irregular teeth near the base: heads radiate, $\frac{1}{2}$ inch high. disposed in a lax somewhat dichotomous cyme: involucre campanulate, calyculate-bracted at base.

Salt marshes at the mouth of the Columbia River, Dr. William P. Gibbons, 1889. The plant has much of the aspect of the well known montane species, *S. triangularis*, but has a different inflorescence, as well as fleshy entire leaves which, from the dried specimen, appear to have had a closely revolute margin.

Layia hispida. A foot high or less, diffusely branched from the base, rather densely hispidulous throughout, and with a few small dark stipitate glands on the involucre:

leaves all narrow and entire: heads small: rays white, but short and inconspicuous: pappus bright white, of 10 aristiform bristles, with copious short villous hairs, the innermost of which are interlaced.

High mountains south of Tehachapi, 24 June, 1889. The species approaches *L. elegans*, but has inconspicuous flowers, entire leaves and a hispid pubescence.

ERIOPHYLLUM TANACETIFLORUM. Suffrutescent below, erect slender, 2 feet high, leafy throughout: leaves thinnish, sparingly floccose beneath, from palmately trifid to somewhat pinnatifid: heads 3 to 7, nearly or quite sessile at the summit of the simple stem: involucre oval, 2 lines high, the bracts broad and nearly equal, acutish; rays none; achenes with a few closely appressed hairs and no resin-glands; pappus of about 8 unequal linear obtuse or retuse paleæ.

Wooded hills of Calaveras County, Calif., between Sheep Ranch and Murphy's, June, 1889.

PRENANTHES STRICTA. Perennial, 2 feet high from simple or branching horizontal rootstocks, glabrous, bright green, not glaucous: radical leaves 6 to 10 inches long, oblong-lanceolate, tapering to a winged petiole, abruptly acuminate, coarsely and repandly dentate; cauline similar but smaller, rather numerous: inflorescence a strict and dense simple raceme 6 inches long; heads erect, their short pedicels single or in pairs; scales of the cylindrical involucre about 8, purplish and with some white tomentose pubescence, calyculate bracts obscure or none: achenes equally and obtusely 15-ribbed; pappus pale-fuscous.

Dry northward slopes, in rocky soil, at about the limit of trees on Mt. Rainier, 20 August, 1889.

MALACOTHRIX ALTISSIMA, Greene, Bull. Calif. Acad. i. 195. Stems solitary, stout, erect, 3 to 6 feet high, simple and leafy up to the very ample cymose panicle: whole plant glabrous, dull green: leaves 2 to 4 inches long, broadly lanceolate,

laciniately toothed or pinnatifid : involucre nearly cylindrical, ½ inch high, the inner series of bracts lanceolate-acuminate, the outer all much shorter, but imbricated in several series : ligules white ; summit of immature achenes with a sharply denticulate border ; the whole pappus deciduous in a ring.

From an imperfect specimen obtained at Tehachapi, Calif., some years ago I had described the species as probably annual. Last season I saw and collected it in the original locality. The solitary stems arise from somewhat deep-seated and apparently horizontally running perennial roots. The species most related to it have tufted and somewhat decumbent stems arising from a common tap root.

MIMULUS SCOULERI, Hook. Fl. Bor.-Am. ii. 100 ; Gray Syn. Fl. Suppl. 448. This fine species, supposed to be very rare, is frequent in the woods of Washington, back of Tacoma ; and I saw it in the herbarium of Prof. Henderson, at Portland, without a name. It is distinguished from *M. guttatus* by the filiform stolons by which as a perennial it is propagated, and also by its narrower, usually cordate, always callous-toothed leaves. The following alpine plant may provisionally be referred to it.

MIMULUS SCOULERI, var. CÆSPITOSUS. Stems slender, tufted and low, 1 to 5 inches high, mostly 1-flowered, perennial by numerous matted filiform or almost capillary stolons : herbage purplish, glabrous or villous puberulent : leaves ovate, cuneate at base and subsessile, slightly and remotely toothed or entire, 2 to 5 lines long : flower terminal, long-peduncled, large ; calyx 4 or 5 lines long, campanulate, the orifice closed in fruit ; corolla an inch long, deep yellow, strongly bilabiate.

Forming mats on the surface of wet rocks along the margins and in the midst of alpine streamlets near snow on Mt. Rainier, 20 August, 1889.

ERIODICTYON PARRYI (Gray). *Nama Parryi*, Gray, Bot.

Calif. i. 621; Syn. Fl. 175. Described originally from "winter vestiges," the characters of the foliage and corollas were not given. The writer obtained it in the original station, a few months since, in full leaf and flower. The well developed leaves, 4 inches long, are sinuately toothed, just as in most species of *Eriodictyon*, and the corollas are rather larger and of a deeper blue than those of the common *E. Californicum* (i. e. *Wigandia Californica*, H. & A.; *Eriodictyon glutinosum*, Benth.). It is a very showy shrub; and the resinous herbage gives forth a strong odor, rather more aromatic and mint-like than that exhaled by other species of the genus. The seeds are four only, and are just those of the common Yerba Santa. If this plant ought to be a *Nama*, the whole genus *Eriodictyon* should go with it.

EUNANUS ANGUSTIFOLIUS. Hirsute-pubescent, the hairs strongly glandular: 2 to 4 inches high, with few ascending branches: leaves narrowly linear (the lowest not seen): calyx prismatic, gradually widening to the orifice, altogether hyaline except the unequal triangular-lanceolate teeth: corolla ½ inch long, with narrow-funnelform tube and strongly bilabiate limb, rich purple; capsule linear-lanceolate, obtuse, thin and translucent, scarcely equalling the calyx: seeds few and rather large, oval, faintly reticulate, with a blunt and very prominent apiculation at one end, merely mucronate at the other.

Western slope of the Washoe Mountains, Nevada, July, 1889, C. F. Sonne.

COLLINSIA STRICTA. Stem slender, a foot high, mostly simple, puberulent, the inflorescence glandular-villous and very viscid: leaves oblong-lanceolate, crenate, on very short villous-ciliate petioles: flowers verticillastrate and crowded, short-pediceled; corolla ½ inch long, flesh-color, the lower lip elongated, upper parted into 2 narrow very acute short segments which are reflexed and laid one against the other.

Bushy hills near Sheep Ranch, Calaveras County, Calif.,

June, 1889. A species closely allied to *C. tinctoria*, but foliage and flowers scarcely one third as large, the corolla of different structure only as regards the upper lip, the segments of which in the more familiar species are not only extremely short and pointless, but are simply reflexed—not replicate.

MONARDELLA DISCOLOR. Rigidly suffrutescent, diffuse, a span high: leaves small ($\frac{1}{4}$ to $\frac{3}{4}$ inch long), ovate-lanceolate, entire, short-petioled, green and nearly glabrous above, white-tomentose beneath, scarcely punctate, the veins prominent beneath: heads small, bracts few, ovate or oblong, obtuse, of firm texture, tomentose-canescent, not colored, parallel-nerved: calyx-teeth short, acutish, woolly-hairy without: corollas light purple.

Gravelly banks of the Yakima River, near Clealum, Washington, 14 August, 1889.

THALICTRUM HESPERIUM. *T. platycarpum*, Greene, Pitt. i. 166, not of Hook. f. & Th. In taking up for a species what Prof. Trelease had proposed as a variety *polycarpum* of *T. Fendleri*, I overlooked the existence of an East Indian and earlier *T. platycarpum*.

ASTRAGALUS ANEMOPHILUS, Greene. Bull. Calif. Acad. i. 186. This, which is the *Phaca restita*, Benth., Bot. Sulph., will include *A. Miguelensis*, Greene, Pitt. i. 33. Specimens obtained last year at various points along the shores of Lower California by Lieut. Pond demonstrate this. Very likely also the *Phaca candidissima* of the Botany of the Sulphur will prove to be but another synonym of the species.

The North American Neilliæ.

The recent discovery of a strongly characterized new congener of *Spiræa opulifolia*, Linn. has led to a critical examination and comparison of the various forms, especially the western, and has rendered necessary an examination of the evidence as to what generic name these shrubs. as excluded from *Spiræa*, ought to bear. Their large albuminous seeds so thoroughly preclude their retention in that genus. that no authors now defend the Linnæan idea.

Cambessedes in 1824. apparently upon the vesicular carpels alone, without having discovered that the seeds were albuminous. elevated the Linnæan type to subgeneric rank, under the name Physocarpos. In 1836 Rafinesque proposed the entire severance of this type from *Spiræa*. He is therefore the author of the genus *Physocarpa*, although Maximowicz. who much more recently adopted the views of Rafinesque as well as the name *Physocarpus*, is accredited, by those American botanists who follow him, as the author of the genus. If the genus is to be recognized. then certainly Rafinesque, not Maximowicz. is the one to be credited with the authorship. This notwithstanding that Rafinesque himself held as valid. Necker's genus *Physocarpon* in the Caryophyllaceæ (date 1790). Possibly at the moment of publishing the homonym he was forgetful of the fact that he had himself published species in the genus of Necker. He was a man well versed in linguistics generally, and is not likely seriously to have regarded *Physocarpon*. *Physocarpus* and *Physocarpa* as being anything more than one and the same Greek-made generic name.

But Rafinesque, recognizing a number of species of these

Spiræaceous shrubs, resolved them into two genera, of which *Epicostorus*, according to the date assigned it by Dr. Watson in the Index, is earlier by four years than *Physocarpa*. I have not, however, seen the paper in which *Epicostorus* is said to have been first published.

The *Neillia* of Don dates from 1825 and is founded on an Asiatic type. I have seen no specimens; but, from the characters assigned, as well as from the wood cut given by Don (Gen. Hist. ii., 57), I judge the course taken by Bentham and by Baillon preferable to that of Maximowiez, *i. e.*, that our American shrubs are quite easily congeneric with their East Indian allies. They are said to agree in habit. One given to noticing the peculiar shreddy and deciduous brown bark of our American bushes would be interested in knowing whether the original *Neillia* exhibits the same characteristic. In the Old World type the fruit is said to be follicular, opening by the inner suture. The American species have carpels either wholly indehiscent or else separating spontaneously when ripe into two distinct valves; the separation taking place first by the outer suture. It is erroneous to call the fruit of any America *Neillia*, which I have knowledge of, a follicle. The inflorescence of the Indian shrubs is defined as racemose or even thyrsoid, while in the American species it is said to be simply corymbose. But in California and in Colorado one often meets with well elongated, and even somewhat compoundly racemose, clusters of flowers on very vigorous shoots. The wood cut in Don, as to the arrangement of the flowers in the type of the genus, can easily be matched on almost any bush of *N. capitata* at flowering time. This fact, doubtless unknown to others who have written upon the systematic relations of our group, has its weight; although there is in truth no radical difference between a corymbose and a racemose inflorescence. The two kinds are equally illustrated within the limits of many a familiar genus.

The following recension of the American species and varieties, doubtless far enough from being a complete and satisfactory account of them, should invite our fellow workers

in different parts of the country to a more thorough and a better directed collecting of them. In the greater part of the specimens, as they exist in our herbaria, I find no representation of the foliage of growing shoots: yet, these alone bear the really normal and typical leaves. The flowering and fruiting branchlets are in reality nothing more or less than leafy peduncles. The leaves of these are always reduced in size, extremely variable in outline and lobing, and should no more be depended on in describing, than should the exactly corresponding peduncular leaves of a leafy-peduncled willow or bramble. They are not the true leaf-type of the shrub, but a kind of bracts rather, strictly viewed, however conspicuous and plentiful they may be. By taking note of the proper leaves, one seems to find considerable differences of form and venation; these differences appearing quite constant, however slight, between the different species. No specimen should be distributed as complete, or reckoned upon as likely to be serviceable, unless a fair portion of sterile main shoot accompany the flowering or fruiting branchlets.

The fruits, it will be seen, have evidently received little attention from recent American botanists. Even the seeds, the size of which as well as their inner structure, furnish the main reasons for a separation between *Neillia* and *Spiræa*, have external characters which are not to be ignored. Of pubescence, even that of the carpels, less use can be made than appears to have been allowed heretofore.

* *Carpels inflated, exserted from the calyx, diverging at apex, bivalvate-dehiscent.*

1. N. OPULIFOLIA (Linn.), Watson, Bibliogr. Index, 29, excluding the var. *mollis* and most of the references (1878): Macoun, Catal. Canad. 127, excl. var. (1883); Tracy, Catal. Pl. Missouri, 28 (1886); Dudley, Cayuga Fl. 28 (1886): B. S. P. Torr. Club, Catal. 15 (1888); Day, Fl. Niagara, 23 (1888); *Spiræa opulifolia*, Linn. Sp. Pl. 489 (1753); Mill.

Dict. ed. 8 : Marsh. Arb. 146 ; Nutt. Gen. i. 307 ; Darl. Cestr. 298 ; Beck, Bot. 98 ; Gray, Man. ed. i. 116 : Seringe in DC. Prodr. ii. 542 ; *Physocarpa riparia*, Raf. New Fl. iii. 73 ; *P. opulifolia*, Maxim., not of Coult. Rocky Mt. Bot. Shrub 4 to 10 feet high, with clustered recurved surculose stems : leaves round-ovate in outline, 3-lobed, doubly crenate-serrate, and, with the calyces and pedicels, glabrous or pubescent : mature carpels 3, 4 or 5, connate below, $\frac{1}{3}$ inch long, much inflated, usually 2-seeded ; seeds broadly obovoid.

From New England and Canada to Wisconsin, Kansas and southward to Florida, but in the extreme southern localities only in the var. FERRUGINEA (Nutt.), Watson. The variety I have not seen. From its special geographical range and from the character assigned to the pubescence, I should suspect it of meriting higher than varietal rank. The *S. opulifolia*, var. *tomentella*, Seringe, which is the *Physocarpa riparia*, var. *tomentella*, Raf. l. c., appears to be only the common pubescent state of the species, scarcely deserving a name as a variety.

2. N. CAPITATA (Pursh). *Spiræa capitata*, Pursh, Fl. i. 342 (1814) ; Nutt. Gen. i. 307 (1818) ; Spreng. Syst. ii. 502 (1825) ; Seringe in DC. Prodr. ii. 542 (1825) ; Eaton, Man. ed. 5. 408 (1829) : *Physocarpa tomentosa*, Raf. New Fl. iii. 74 (1836) ; *P. opulifolia* or *glabra*, Raf. l. c. 73, in part : *Spiræa ribifolia*, Nutt. in Torr. & Gray, Fl. i. 414 (1840) ; *S. opulifolia*, var. *mollis*, Torr. & Gray, l. c. ; *N. opulifolia*, var. *mollis*, Brew. & Wats. Bot. Calif. i. 171 ; Macoun, Catal. Canad. 127 : *Physocarpus opulifolia*, Coult. Rocky Mt. Bot. 78, in part. Shrub 8 to 25 feet high, the long sureuliform stems and branches recurved or tortuous and reclining among the branches of trees : leaves 2 to 4 inches long, $\frac{2}{3}$ as broad, 3-veined, cleft at or below the middle into 3 lobes of which the terminal is twice as large as the divergent laterals, the whole margin with incised secondary lobes, these serrate-toothed, more or less stellate-tomentose beneath, often glabrate above : inflorescence usually corymbose, not rarely

racemose and the raceme branched below : carpels as in the preceding : seeds slenderly and obliquely pyriform.

From the neighborhood of the sea eastward to the Sierras and the Cascades, and from San Francisco northward to Puget Sound ; the surculose stems, often more than twenty feet long, interlaced among the branches of willows and laurels, and forming the most impervious thickets along the banks of streams. Extremely variable as to pubescence, and with little except the form of its seeds to mark it as distinct from the eastern shrub. I can but propose its restoration to specific rank ; for the seeds are very different. Nuttall, who named it *ribifolia*, must have seen a leaf-character ; but the proper leaves of the true *N. opulifolia* I am now ignorant of. The pedunculer foliage, variable in both, exhibits general differences. In the eastern species these leaves have a rounded outline ; in the western they are much more elongated and angular, with a decided leaning to the rhomboid, or rhombic-lanceolate in Oregon and Washington.

Pursh, who appears to have seen only imperfect specimens of this his species, did not know that the carpels became inflated. Seringe accordingly excluded it from the Physocarpus section. The pods are, on the average, a little larger than those of the eastern shrub, quite as much inflated, sometimes more, sometimes less coherent at base, usually glabrous northward, but, in California commonly a little tomentose.

3. N. MONOGYNA (Torr.) *Spiræa monogyna*, Torr. Ann. Lyc. N. Y. ii. 194 (1827) ; Eaton, Man. ed. 5. 409 (1829) ; *Epicostorus montanus*, Raf. "Atl. Journ. 1832. 144" (*teste* Wats.), New Fl. 3. 74 (1836) ; *Spiræa pauciflora*, Nutt. in Torr. & Gray, Fl. i. 414 (1840) ; and *S. opulifolia*, var. *pauciflora*, Torr. & Gray, l. c. ; *Neillia Torreyi*, Wats. Proc. Am. Acad. xi. 136 ; *Physocarpus Torreyi*, Coult. Rocky Mt. Bot. 78. Barely 2 feet high, erect, scarcely surculose, freely branching : leaves of rather deltoid-ovate outline, incisely 3-lobed to the middle, the lobes nearly equal, the whole with

slight secondary lobes, these crenately (on the peduncles) or incisely (on vigorous shoots) toothed: flowers few in the corymb, but the corymb usually compound: petals larger and more showy than in other species, often rose-tinted: carpels mostly 2, coherent to above the middle, but little longer than the calyx, divergent at apex but only slightly inflated, minutely tomentose, 1-seeded: seed obovoid.

Rocky Mountains of Colorado, throughout the state, from the foothills up to the altitude of 8,000 and even 9,000 feet, always in dry soil on rocky slopes in open or somewhat shaded ground. With its neat small foliage and comparatively large flowers, not dull, but always clear white when not tinged with rose, this is the only really ornamental species. The above description is drawn from specimens obtained by the writer during the past season. The species is said to occur in Utah and Nevada. The two ovaries are so closely united as fully to warrant the specific name given by Dr. Torrey, although that name is here resumed solely in view of its priority.

** *Carpels not inflated, included in the calyx, erect and straight at apex, indehiscent.*

4. N. MALVACEA. Shrub 3 to 5 feet high, stout, the shoots erect: leaves digitately 5-veined, with or without 3 broad and shallow lobes above the middle, the general outline orbicular or oval, with many slight rounded and crenately toothed secondary lobes: corymbs mostly simple, short-stalked: calyx tomentose, very large, broadly campanulate, its lobes in maturity connivent over the fruit: carpels 2 (sometimes 3), connate above the middle, compressed, indehiscent, 1- or 2-seeded: seed large, oblong-obovate.

Dry rocky banks above the northern shore of Lake Pend d' Oreille in northern Idaho, in leaf and fruit only, 9 Aug., 1889. A most distinct and remarkable species, with more external resemblance to *N. opulifolia* than to any of the western species; but the characters of the calyx and fruit,

as well as the five-veined leaves, often broadest above the middle and only slightly 3-lobed almost at the apex, are all very striking. The pubescence, stellate as in other species, is variable in its quantity, except upon the pedicels, calyces and carpels, where it is always dense. The reduced pedunecular leaves lack the digitate venation displayed in those of the sterile shoots, and have an angular outline; but all their lobes and teeth are rounded. The flattened orbicular and merely bifid fruit, so small and entirely hidden within the large closed calyx, is like the silicle of a large *Lepidium* in appearance.

Notwithstanding its many and strong peculiarities as a species, I suspect that the *Neillia* of Montana will be a part of this, and that the same may be true of more or less of that which, derived from Nevada and some parts of Utah, has been referred to the "*N. Torreyi*," *i. e.*, the preceding species.

Geographical Distribution of Western Unifolia.

My recent extensive journeyings through Rocky Mountain and Pacific coast states and territories taught me several things concerning the distribution of our *Unifolium* species, so that I am able to correct a few wrong inferences hazarded in some earlier paragraphs, to which I now revert.

U. LILIACEUM, Greene, Pitt. i. 280. My type of this species is a plant collected by myself in Siskiyou County, California, as long ago as 1876. Dr. Gray at the time called it "*S. stellata*," to which I never could agree. The plants were found in shady places along streams; and the herbage had that peculiar bright green hue which is characteristic of *U. sessilifolium* as compared with *U. stellatum*. From *U. sessilifolium* it differs in its upright attitude, scattered (not distich-

ous) leaves, which are plane (not at all plicate) and not conspicuously nerved or ribbed, and the absence of the zigzag characteristic of stem and raceme.

I now retain with this type, a similar plant from the Geysers of Sonoma County, California. The fruit of these is unknown to me. The inference that the "*S. stellata*," Wats. Bot. King. belongs here is unwarranted. The plant of the Donner Lake region appears to be *U. stellatum*, and such in all probability is that of King's Report. Also Mr. Macoun's Vancouver Island plant referred to by me as possibly *U. liliaceum*, may be *U. stellatum*, although it was distributed as "*S. sessilifolia*."

U. SESSILIFOLIUM (Nutt.) Greene, Bull. Torr. Club, xv. 287; Pitt. l. c. Mr. Watson in the Botany of California says: "It has usually been confounded with [*U. stellatum*], which it sometimes closely approaches." That he was at that moment himself confounding the two is clearly evinced by the account he gives of the berries. He describes them as "nearly black." They are nearly black in *U. stellatum*, but in *U. sessilifolium* they are of a clear and rather light cherry red, several shades lighter than ripe red currants. Even in the herbarium they retain for years this bright and beautiful color. The arcuate and flexuous stem, and the rather heavily veined leaves, in early stages of growth plicate like those of a Veratrum. are good marks; but the most distinctive thing about the species is its own peculiar shade of green; a light and bright color; a green with much yellow in it. *U. stellatum* is of a widely different very pallid shade, as if the plant were glaucous. In this one respect, as well as in color of berries, it is pretty certain that they do never approach each other. No botanist, unless sadly deficient in botanical vision, could ever confound the living plants: while even in the herbarium the distinctive hues are usually in no small degree retained.

The habitat assigned the species in the Botany of California is "From Monterey County to British Columbia, and eastward to the Wahsatch." But in California the species is quite evidently restricted to the Coast Range, where it is very abundant.

It has never come to me from any correspondent residing or collecting anywhere in the Sierra Nevada; and I have sought it vainly during hundreds of miles of travel in that region. Mr. Watson's plant of the Wahsatch, and other localities lying eastward of the Coast Range will probably be the one which furnished the "nearly black" berries of his specific character, which, unless it prove to be my *U. liliaceum* in fruit, should be *U. stellatum*. Neither in the Wahsatch nor in any other range of mountains in Utah or Nevada is there any recurrence of the peculiar climatic conditions of the Coast Range of California. Copious winter rains, little or no snow, scarcely a frost, the ground never frozen.—these are the conditions under which this species thrives; and we should as much expect the redwood, the laurel and the peculiar herbaceous flora of the Californian coast to be found in the cold and dry interior basin, as this plant. Nevertheless, in one place well to the eastward of the Cascade Mountains, it does occur. I refer to the lake region of the extreme northern part of Idaho Territory. Here there seems to have been let down, as from the Alaskan coasts, a considerable tract of moist coast forest, into the midst the cold and dry interior. At Lake Pend d'Oreille are repeated the dense swampy evergreen woods of a far northwestern sea-coast district; and here, in the same rich soil, in deep shades of fir and arbor vitæ, one meets with plenty of *U. sessilifolium*; and here too, outside of and above the ~~out~~ woods, on open ground and in dry soil grows the unmistakable *U. stellatum*. It is the only ground upon which the eastern and the western species are known to meet; and there the contrast between them is striking enough, every way.

U. STELLATUM (L.), Greene, Bull. Torr. Club, xv. 287. This crosses the continent; occurring near Pacific shores not only northward in British Columbia and Washington, but even in southern California. Not far north of the borders of Los Angeles County I observed and collected it last June. This particularly interesting and unexpected station for the species

is among the higher mountains which bound the Mohave Desert on the westward side, and at a point only a few miles southward from Tehachapi, in moist meadow lands near streamlets; and the growth of the plant is fairly luxuriant. It is also abundant on the mountains in the northern part of Arizona, varying considerably in size, comparative breadth of foliage, and even in the form of the perianth segments (these almost linear in narrow-leaved forms, oblong, or even obovate-oblong in the broad-leaved states); but the habit of the plant, its peculiar pallor and the blackish purple of its berries are thoroughly constant marks. Farther northward, in Montana and Idaho, it is larger and less variable in size and form of leaves, and is as generally prevalent in mountain woods and by streams. The leaves in the species I find altogether sessile; so that Nuttall's name for the preceding is in no wise characteristic.

U. RACEMOSUM (L.), Britton, Trans. N. Y. Acad. viii. 74. Although Mr. Watson limits the westward range of this to the Winnipeg Valley, I should say we have plenty of it on the Pacific coast. All the "*Smilacina amplexicaulis*" of collectors in Oregon and Washington seems to me to be a good deal more like the eastern species; indeed, inseparable from it. A fine specimen, from Goldstream, Vancouver Island, May, 1887, by Mr. Macoun (labeled *Streptopus amplexifolius*), I refer without any hesitancy to *U. racemosum*. The leaves are rather broader than in New England specimens, but no other difference can be noted. Dr. Britton makes the same disposal of the plant of the Mogollon Mountains in southern Arizona; but my own specimens from the Pinos Altos in southern New Mexico (1881), have the narrow and open inflorescence, though not the foliage nor the habit of *U. amplexicaule*, to which species Dr. Gray referred it.

U. AMPLEXICAULE (Nutt.), Greene, Bull. Torr. Club, l. c. This differs from the preceding in more respects than have hitherto been enumerated. The broad pointless leaves are

ascending, or even almost erect on the stem. The inflorescence which, if it were conformed to the habit of the plant, would be broad and compact, is more elongated and open as well as narrower than in *U. racemosum*. The rootstocks are thicker and have shorter internodes. It is particularly common in the California Coast Range, occupying higher ground than its associate, *U. sessilifolium*, preferring less moisture and a more clayey soil. Perfectly true to the Californian type it occurs as far eastward as Montana.

Our fellow laborers in the field, especially the few of them who have the happiness of working from year to year along our northwestern or southwestern borders, should help us by giving particular attention to these plants; supplementing good specimens (these so made as to show ripe fruits, and the rootstocks also), by notes of habitat, hues of herbage, and color of berries when fresh and fully ripe. The lines of demarcation between some species are not yet sufficiently indicated, nor can they ever be well drawn by the unaided efforts of the closet botanist.

The Color Character.

There is an aphorism of Linnæus which freely rendered runs like this: *Color* in the same species varies greatly, hence for the discriminating of them it is valueless.[1] That in many species the color, especially that of the flowers, varies extremely is undoubted; but it does not follow that it may not be in many others quite unvarying.[2] There is no

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[1] *Color* in eadem specie mire ludit, hinc in differentia nihil valet.
—Fundamenta Botanica, No. 266.

[2] Albino states are not here taken into account. There are perhaps few species of flowering plants in which this freak does not occur. Yet there are botanists who would recognize it, and give it a name in every instance. These are probably unaware how great is the number of

kind of character which can always be relied upon; and that of color has often been employed in diagnosis by the most philosophical of modern botanists. If Linnæus himself did not formally employ it, he did by implication recognize it as having value. In another of his aphorisms (Fundamenta, No. 259), he requires that names shall be taken from such characters only as are constant; then, having passed judgment against color as untrustworthy, he proceeds with a free hand to name species according to color. The following are some names to be found in his genus *Lichen*: *L. fusco-ater*, *atro-virens*, *atro-albus*, *pallescens*, *subfuscus*, *olivaceus*, *croceus* and *miniatus*.[1] Of course, in lichenology as well as in mycology, color is of great value; but Linnæus made no exception of these; and even in phanerogamic botany, his usages in naming species were in the same manner in conflict with his rules. He found the color of corollas sufficiently characteristic and entirely constant in the plants which he named *Lilium candidum*, *Lobelia cardinalis*, *Allium roseum* and *flavum*, and in many more.

I need not add to the list, recently published in another place,[2] of familiar species which are both named and characterized by the color of their flowers. I may perhaps more profitably adduce a few cases in which this very character bears a value even higher than specific.

In the Californian flora we have two or three scarlet-

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species in which white-flowered individuals have been observed. Most botanists rigidly exclude them from any place in nomenclature; and this exclusion would be necessary even in the case of the many intensely blue western larkspurs whose albinos are never white but always flesh-color or pink. I have observed the pink-flowered freak in *Delphinium decorum*, *trolliifolium*, *hesperium*, *Parryi*, *scaposum*, and I think in one or two more; have learned to expect it in any blue-flowered species, and should never think of naming them as varieties.

[1] That the Fundamenta were published before Linnæus had decided upon binomialism signifies nothing. He never rescinded his aphorisms. Did he forget some of them?

[2] J. F. James, Bull. Torr. Club. xvi. 268.

flowered species of larkspur. In respect to color, they present a strong contrast to the more numerous deep blue species. In the books they are made to form a group by themselves, and the group is characterized by the color of the flowers, that being the most distinctive mark which the several species collectively exhibit. The grouping is natural. These red-flowered kinds are in other respects more like one another than any one of them is like any of the blue-flowered species; but the color is received as being the most significant characteristic of the group as such. No one is likely to dispute that *Lobelia cardinalis* and *L. splendens* are more closely related to each other than either of them is to any blue-flowered species; and here also it is the color of the corolla which the phytographer seizes upon as chiefly indicative of their close consanguinity. It at once binds them together as a group, and in so far separates them from their blue-flowered kindred of the same genus. In *Gerardia*, and in a hundred other like instances, there is a purple-flowered natural series of species, and a yellow-flowered series; and the color is received as a subgeneric character.

In that natural assemblage of genera known as the Asteroid tribe of Compositæ the color of flowers is accepted, if not without some exceptions, generally at least, in the full dignity of a generic character. Asa Gray made even a higher use of it. In the Synoptical Flora of North America he distributed the thirty-five genera of this tribe under two subtribes which he called Homochromeæ and Heterochromeæ; the former including a series in which the flowers of both disk and ray are yellow, the latter comprising those in the disk-flowers are yellow, while those of the ray are of some other color, such as white, red, purple or blue. In the light of prolonged field experience in the study of American Compositæ—an experience running through many years, and covering a greater and more varied extent of territory than even Nuttall traversed—I perceive, unmistakably I think, that in the treatment of the Astereæ to which I now refer, there is laid upon the color character greater weight

than it can sustain; that the subtribes Homochromeæ and Heterochromeæ are to a considerable degree unnatural; that by drawing the subtribal line at color there are sundered widely, in the books, some genera which in nature stand closely side by side. And we have, on the Pacific coast, two genera at least, *Lessingia* and *Pentachæta*, which are too well marked in habit and in morphological character to be broken each into two on account of color. Each of these has its series of yellow-rayed and of white- or purple-rayed species. There are also, in the same local flora, a few instances in which Asteroid genera are too arbitrarily distinguished by color only; cases in which white- or red-rayed species are injudiciously made to form a separate genus, instead of being added as a heterochromous series of species to a homochromous genus.

However, cases of this kind, in the tribe of composites now under passing notice, are exceptional; and the rule here is that color is of generic value. In all the large genera of the tribe, and those which enjoy a wide and general geographical distribution, the distinctions of color are fundamental. Even where, as between *Solidago* and *Aster*, there is the noticeable but scarcely definable general difference of aspect, when you are asked to name an absolute character by which to distinguish them, the difference in color of flowers is the only only one that can be produced; and that is constant. Nor is the difference of *facies* so strong but that several rather large-headed and long-rayed Golden-rods would be perfect Asters if their rays were changed from yellow to white or purple. If *Aster multiflorus* had been dressed out in yellow instead of white corollas, it would easily have found its place in *Solidago* alongside *S. nemoralis*. And although *Solidago bicolor* has white rays, and is well conformed to the general habit of the Golden-rod species, if its disk-flowers had but shown a tendency to change to purple in age, after the manner of those of most or all true Asters, that mark, along with its white rays, would have placed it in the genus *Aster* without a dissenting voice from any botanist who ever made a special

study of these plants; so great is the weight which changeability of color carries with it as a character in this tribe. Again: *Aplopappus* and *Chrysopis*[1] are distinguished from *Erigeron* by color of flowers alone. In the last the rays are not yellow, and the yellow of the disk changes to purple. In both the preceding all the flowers are permanently yellow; and this is all. In a word, the former are homochromous, the latter like *Aster* is heterochromous. And many an excellent botanist, in dealing with dried specimens of new species, has placed one or more of his novelties in a wrong genus, through a wrong guess as to the color of the flowers. A considerable list could be made up from the synonomy of Asteroideæ, of species which were by such mistake at first published in *Aster* or some other such genus, and afterwards transferred to the proper homochromous genus, upon the discovery of the fact that their rays were yellow. Although the color character is not even here absolute, one hazards nothing in asserting that to abandon it as no longer one of the fundamental principles of classification in this vast tribe of plants, would be to plunge the whole tribe into phytographic chaos.

Although the Linnæan pronouncement against color is a general one, there are other organs besides the flowers, in relation to which it is even more generally and more successfully employed in the diagnosis of species. And here, too. Linnæus, notwithstanding his adverse aphorism, in practice leads the way. Take the genus *Salix* for an illustration. In it he names *S. vitellina* and *purpurea* in reference to the widely and constantly different color of the bark upon the branchlets; *S. fusca* because of a dark shade of color appertaining to the upper surface of the foliage and to the catkins; *S. glauca, cinerea* and *alba* each in allusion to a particular shade of green in the foliage. Names of this kind are plentiful throughout the whole Linnæan nomenclature of common trees and shrubs, and have been taken into use in every case,

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[1] These are distinguishable from each other by no absolute character, and are merged in one by M. Baillon.

as descriptive of some shade of color in the wood, bark, foliage or flower which is characteristic of the species. Even so among the homeliest of weeds: in *Chenopodium* for example, we have *C. rubrum*, so called because its fruit is red, and *C. album* and *viride*, their herbage marked in nature, that of the one by a light, of the other by a darker shade of green, each fitly named in accordance with such difference of color.

To enumerate all the classical examples of the value of color in the diagnosis of phanerogams, would be to write a book. With the almost absolutely ordinal value of it in the lower orders, from Sphagnaceæ and Musci down, all, even beginners in cryptogamic botany, must be acquainted: and yet we have botanists who will not listen to words in defense of color as a distinguishing feature among species of plants; men who still swear by the pleasing but rather vacuous phraseology of the Linnæan aphorism.

Analogies and Affinities.

II.

It is commonly asserted by medical botanists that the same therapeutical qualities inhere, though often in very different degrees, in all the species of a genus; or even in all the plants of an entire natural order. Systematic botanists in general agree to this; are apt to be well aware of it, although such kind of fact is excluded from the formal diagnosis of the genus or order as unimportant. In partial justification of this exclusion it may be said that like principles, in so far as medical activity is concerned, reside in plants of widely separate natural alliances. But, while one may not well question that the same active principles may reside in two genera of plants not at all related, still, it may not safely be ignored that the therapeutic effects may be induced by different active

principles. That certain vegetable products taken internally produce emesis, argues little for the identity of chemical principle in all vegetable emetics, and perhaps less for the consanguinity of the plants which yield them, other considerations being left out of view. Notwithstanding this last concession, the first proposition holds good, that a common medical property will often run through all the hundred or thousand species of a large family of plants. Such a property is doubtless good evidence of the recognized common affinity, in such a case; while its recurrence elsewhere may be of analogy only, or it may indicate a real affinity which might or might not otherwise have been suspected, between families or genera. In view of this kind of possibility, it seems as if there might be at least the chance of some improvement in the system of botanical classification, by giving more attention to the properties of plants in relation to their affinities.

The therapeutic aspect of the subject may here be dismissed, in favor of what I assume to be a more general and at the same time a more delicate, and, to botanists an equally satisfactory test of the qualities of plants.

Some months ago, a botanical friend remarked to me—what I had often before reflected on—that it seemed strange men should never make use of any other sense than that of vision in botanical diagnosis. Why should we not employ more freely and more trustingly our tasting and smelling faculties along these lines of investigation? By means of these two senses men do lay hold securely on many a fact which completely eludes their keenest visual search, even when aided by the best microscopes. As tests of the presence of certain qualities in plants—whether therapeutic or not it matters not—these two senses are far more delicate than are those organs by which the results of therapeutical activity are manifested.

One reason why botanical authors in general make so little of the odors and flavors of plants is, that in the *hortus siccus* these qualities do not appeal to them. For another, we may advert to the weight which certain scientific precepts vener-

able with age still seem to carry with them :[1] precepts which both give support to, and are themselves sustained by the prevailing idea of the supremacy and finality of herbarium determinations and decisions; precepts which nevertheless display in their construction quite as much of literary ingenuity as of accord with well known facts. If the most eminent botanists of the last two centuries have been somewhat equally divided in opinion as to whether Bergamot mint and Peppermint—distinguishable from each other by odor only –are different species, or mere varieties of one, then it must be confessed the question of the sufficiency of odor as a distinguishing mark of species is still open to discussion, and the time for receiving as axiomatic the Linnean aphorism is not yet come. Again, as regards flavor; the taste of Spearmint may or may not be quite the same to every one; yet it can hardly be that the flavors of Spearmint and of Peppermint will by anyone be declared identical; but the perception of a difference is all we want. A definition of either flavor would no doubt be impossible; but no definition of either is necessary. The existence of a difference is the essential fact.[2]

Organographical characteristics, especially of flower and fruit, are fundamental—indeed, almost the only admitted factors—in the general classification of plants. Properties are by common consent excluded from the regularly formulated character, whether of an order or a genus; but the mention of them is usually made in a sort of note, or separate paragraph at the end, as if they were of secondary im-

[1] *Odor* speciem nunquam clare distingnit.—Fundamenta Botanica, No. 267.

Sapor pro ratione manducantis sæpe variabilis est, hinc in differentia excludatur.—Ibid. 268.

[2] It is even so in the case of morphology, which is definable. The descriptive botanist calls one leaf-type *ovate* and another *lanceolate*. The terms are of conventional rather than absolutely definitive force. But they demonstrate a *difference* it may be between species: and precisely herein lies their essential usefulness as terms.

portance—something merely incidental to the genus or the family. It will be curious at least—perhaps more than a mere gratification of curiosity—to note instances in which the organographical type of a genus or family breaks down on all hands, changing into something else, and bidding defiance to the formulated character at many a point, while the common property alone remains as the one absolute peculiarity of the group, pervading every species in it, and being conterminous with it. Quite such a family as this we have before us in that extremely natural order, the Cruciferæ.

The morphological type of this order is most characteristic and distinct from all others. The six tetradynamous stamens, along with the peculiar bilocular and bivalvular fruit coeur nowhere else in nature. If silique and silicle had been constant throughout the family, its character as a natural order could have been drawn up in one or two brief sentences. That framed by Jussieu (Gen. 237) a century ago, comprised in a few short lines of large type, would have been abundantly sufficient. But that of Bentham (Benth. & Hook. Gen. 57), some seventy years later, occupies, the *former abnormes* included, a very large page of small type, yet falls considerably short of embracing all the odd forms of pericarp now known within the order.

The true silique, happily the prevailing type, retains all the essentials of its structure even while disguising them more or less effectually throughout a long series of shortened or siliculose forms, cylindrical, globose and double-globose, compressed and obcompressed, immarginate and winged, cordate and obcordate, triangular and fiddle-shaped. Then again in certain genera, its valves are sealed and it becomes an altogether indehiscent fruit, siliquiform in outline only (*Raphanus*); or the whole breaks transversely into indehiscent one-seeded joints (certain species in several genera); or the joints are two only and very dissimilar (*Crambe* and *Rapistrum*). In many a genus we have fruits altogether nut-like in their conformation, that is to say, one-celled, one-seeded, indehiscent, with pericarps of leathery, cartilaginous,

woody, or even bony texture. These last, as well as some of the dehiscent kinds, are often furnished with curious wings (*Peltaria*, *Thysanocarpus*, etc.), or ears (*Anastatica*), stout spines, horns and hooks (*Octoceras*, *Notoceras*, *Parolinia*, etc.). The instances in which carpal type of the Cruciferæ wanders away into unsiliquose mimicry of the fruits, and even other organs of remote families are rather numerous. The pods of *Isatis tinctoria* strongly resemble the samaras of the ash tree; those of *Thysanocarpus* and some others the elm; those of many species of *Lepidium* are exteriorly quite like the capsules in *Veronica*; those of *Cakile* and *Crambe* would be naturally mistaken for large flower-buds in some other family of plants, if one did not know. The pericarps of *Tauscheria*, and more particularly those of *Thysanocarpus conchulifer*, are like small sea-shells.[1]

The fruit of the order takes quite as surprising departures from its type in another direction; as when in *Tetrapoma*[2] it is found four-valved and wholly or partially four-celled; or in *Tropidocarpum*,[3] where it is not only one-celled, but opens bivalvularly from the apex, thus exhibiting precisely a certain capparideous type of pericarp.

The organographic bond which, in the earlier years of this family's history, seemed to hold all the genera together in despite of the wide carpological aberrations, was that of the tetradynamous stamens. By this character, along with that of the cruciform corolla, a tyro might recognize almost any of the plants belonging to the order. The few exceptions to tetradynamy were not troublesome, so long as they were only numerical, namely, by the stamens being reduced to four through suppression of the two short ones, or even to two by the absence of the four long ones. But in the light of many discoveries made chiefly within the last fifty years, the exceptions are become troublesomely varied as well as here and

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[1] See Bull. Torr. Bot. Club, xiii 218; Pitt. i. 31.

[2] Turcz. Linnæa, x. Lit. Ber. 104; Baillon Hist. iii. 186.

[3] *T. capparideum*, Greene, Pitt. i. 217.

there almost prevailingly numerous. Very many are the species now known—and they distributed through several genera—whose six stamens are of precisely equal length; while in a number of capparids the tetradynamy, formerly thought of as limited to cruciferS, is not in the least obscure. In *Vella pseudo Cytisus*, a crucifer, it is perhaps only emphasized by the circumstance that the four long stamens are in two monadelphous pairs; but in a lengthy series of Pacific North American species which have been placed in different genera all far too near *Arabis*, the stamens are in three very unequal pairs, the longest pair monadelphous sometimes near the base of the filaments only, but often almost up to the base of the anthers. The numerical analogy of tetradynamy is, indeed, preserved; the character itself is gone. But in *Megacarpæa polyandra*, unquestionably a crucifer, the stamens are more than six,—even indefinitely numerous. However, it is in the distinctive kind of hypogynous insertion of the stamens in the family, that we find the nearest approach to an absolute floral character; but this fails signally in *Subularia*, the stamens of which are not hypogynous at all, but clearly perigynous, the sepals cohering to form a calyx-tube.

The regularly cruciform spreading of the petals, a circumstance long ago suggestive of the name which the order now bears, may not have been thought of at any period in the history of the science, as a fundamental characteristic. Irregularity in this floral circle in *Iberis* and other Old World genera was always known. But I may here take occasion to speak of a curious way in which the cruciform aspect of the corolla is obscured throughout a lengthy series of Pacific North American species; a striking peculiarity of them as it appears in the living plants. In all of them—*Streptanthus*, *Caulanthus*, some of the kinds of *Thelypodium*, etc.—the blades of the petals are narrowed extremely and set apart, into two pairs, an upper and a lower, so that the corolla as a whole is in a manner bilabiate, the upper lip and the lower, so to speak, being rather widely separated,

the two individual members of each lying parallel to one another.

There is no floral organ more depended on by systematic botanists than the calyx. Its usefulness as furnishing the most unfailing characters for the genera in many an order, and even ordinal characters, is recognized everywhere. In this family the sepals are four, distinct, hypogynous and imbricated. To this diagnostic phrase *Subularia* becomes, as above noted, the most remarkable exception, in that its calyx is gamosepalous. The sepals in a few genera are said to exhibit the valvate mode of æstivation. Commonly the four sepals are in somewhat unequal pairs, the laterals being a little smaller than the other two; but the difference is usually insignificant. In some Californian species, however, the laterals combine with the upper one in such wise that, in the expanded flower the three form as it were a broad and somewhat concave upper lip widely separated from the solitary lower one; so that this organ is more bilabiate than the corolla is in the same species. In *Streptanthus polygaloides* while the petals are reduced to insignificant almost filiform organs without color, the large yellow calyces completely simulate a papilionaceous corolla insomuch that none but an experienced botanist would suspect the plant of being a crucifer at all, unless he should see its pods or taste its herbage. In this most anomalous flower the lower sepal, quite large, is boat-shaped and keeled; the two laterals are so much reduced in size as to be easily overlooked; the upper one, broadly obovate, is, in the bud, conduplicately folded down over all the others, completely concealing them, while in flower it is spread out and stands erect, precisely like the large banner of a pea-blossom.

Let me conclude these discursive paragraphs on the floral morphology of the Cruciferæ by an illustration taken from the experience of a public instructor in Californian botany. With the purpose of leading his students to an acquaintance with natural families, he will select this one among the first, both on account of the naturalness of it, and because of the

ease with which its typical flower- and fruit-structure may be defined and recognized. Having pointed out the tetrasepalous calyx, the cruciform-tetrapetalous corolla, the six tetradynamous stamens and the distinctively siliquose fruit, he must now take care that he select his illustrations from gardens, fields or waste lands where either under cultivation or spontaneously the Old World plants abound. When, under these precautions, he has impressed upon the minds of the beginners, a clear notion of what cruciferous plants, as to their anthology, should be like, he may send them forth to the woods or untilled hillsides where native crucifers prevail, to collect these. The mission may be nearly fruitless. The most common and beautiful of our indigenous genera and species will escape their recognition. The streptanthi, if past flowering and in fruit, may get gathered, for their pods are true siliques; but their colored calyces variously distorted, the uncruciform corollas, and the anything but tetradynamous stamens are all delusive. The charming lace-pods (*Thysanocarpus*), whose flowers are too minute for field examination, have the most ornamental of fruits, but these are plano-convex broadly and fenestrately winged samaras, presenting to the unpractised eye not the remotest hint of either silique or silicle. While *Athysanus* and *Heterodraba*[1] have indehiscent fruits not quite so unlike proper silicles, their six stamens are not only of exactly equal length, but are disposed three in a line on either side of the minute and flatly compressed ovary. *Tropidocarpum* with a good cruciform flower will confront the tyro with a pod which, while looking like a silique at first, opens from the top and has no partition within. Along the seashore *Cakile* will present its own anomalous fruits which will scarcely fail to be mistaken for large and well developed flower-buds.

In a flora where, as in that of California, exceptional types of floral and carpal structure predominate, the test of flavor, in the case of the Cruciferæ, may well be brought in to the

[1] See Bull. Calif. Acad. i. 71–73.

relief of the embarassment of the instructor, and to the assistance of those waiting for instruction. By the peculiar taste of the fresh herbage alone every cruciferous plant known to me, might by any novice be referred to its proper order almost infallibly; and, I am in the habit of calling on my pupils to apply this test. It is an unconventional one; but it is found the most serviceable of all which can be applied in case the organographical peculiarities one or all become obscure or obsolete.

This flavor of the Cruciferæ is said to be due to the prevalence of a peculiar volatile oil.[1] One may describe it as acrid or pungent; but there is no other flavor with which it may be compared, and an exact definition of it in words becomes impossible. It is assumed to indicate and represent those well known stimulant and antiscorbutic properties which pervade the entire family. It is found most intense in the roots of the Horseradish and the seeds of Mustard; but every cruciferous plant yields it in some degree. This peculiar taste may be subsidiary to the rather keen bitter one meets with in several genera; or it may commingle with the saline flavor common to several maritime species; or it may even be more than half suppressed beneath the strong garlicky taste of *Alliaria officinalis* and some other Old World crucifers; but its universal prevalence, as one of those sensible properties which our organs of sight can not detect, is the sole absolute characteristic of this important natural assemblage of plants.[2]

The closest analogy to the Cruciferæ in respect to the characteristics now under notice, is that which the species of *Tropæolum* exhibit. The flavor of the herbage of these

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[1] De Candolle, Essai sur les Prop. Med. 112.

[2] In this connection it will be interesting to note that Crantz, one of the most original of botanists, and one of the most important among the early supporters of the doctrine of a natural as opposed to artificial systems of classification, took the name which he proposed for this order (*Antiscorbuticæ*, Crantz, Stirp. Austr. pp. 5 55 (1769) from the medical property, preferring it to that which Adanson had fixed upon (*Cruciferæ*) in reference to floral character.

plants, if not quite the same, is very near to it; so near that the one suggests the other very distinctly; and Lindley (Nat. Syst. 140) quotes De Candolle as having remarked that the caterpillar of the Cabbage butterfly feeds exclusively upon Cruciferæ and Tropæolum. This must be a case of pure analogy; not an index of relationship. The morphological gap between them is much too wide. But it ought here to be remarked that the real affinities of *Tropæolum* are with an assemblage of plants noted for their mimicry in the matter of odors and flavors. From the genus *Pelargonium* one might indicate a long series of species each one of which so imitates the odor of some other herb or fruit that a blindfold botanist familiar with them could identify such species of the genus by their odors alone.

The Capparideæ are always and everywhere looked upon as next of kin to the Cruciferæ; and I am entirely of the opinion expressed by Lindley that these are the only plants to which the Cruciferæ have any affinity whatsoever: that the anthological and carpological resemblances which such genera as *Chelidonium* and *Glaucium* bear to cruciferous types —resemblances which the Jussieus and De Candolles, Adanson, Spach, Baillon, Bentham and many more have construed as denoting a real affinity—are analogies only; merely casual surface mimicries from which nothing of real consanguinity can satisfactorily be inferred. "The totally different structure of the seed" is Lindley's apparently conclusive argument against the consociation of Papaveraceæ with Cruciferæ. Additional support, but of less strength, is given to Lindley's view in my mind, in the fact that the juices in the former are always lacteous and narcotic, whereas among the latter in no instance is there revealed a trace of such qualities.

As the herbage of the capparids is more generally glandular-pubescent and oily to the touch than that of the crucifers, so the odor which they exhale is more pungent and intense; but it is a different kind of odor, notwithstanding that the adjective vocabulary in this realm of knowledge is

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too limited to admit of our describing either of them. Even the one illustration of this difference which I have to offer will be understood only by the very few field botanists who are conversant with the native plants both of the Californian coast, and of the less traveled and phytographically very dissimilar regions of the remote interior along the bases of the Rocky Mountains. If, in the course of an autumnal twilight stroll in some Californian field, I should perceive a certain familiar pungent smell —neither wholly disagreeable nor altogether pleasant —I should thereby recognize infallibly, without attempting to pierce the dusk by eyesight, the presence of a certain species of tarweed, *Hemizonia corymbosa*, one of our common Madioid composites. If the same odor should greet my sense after nightfall away upon the plains of the Missouri, the Platte or the Rio Grande. I should know that my foot had bruised the herbage of some *Polanisia* or *Cleome*. It is another case of close analogy in sensible qualities between plants not at all related. But, on the other hand, while such genera as *Cleome* and *Polanisia* are closely allied to the Cruciferæ, there is probably no species of either genus which may not be recognized as a capparid and not a crucifer, by the smell or taste. And this difference of sensible quality appears to hold good with such plants as, morphologically considered, seem intermediate between the two families. Nuttall's genus *Stanleya* is undoubtedly a crucifer; yet Pursh, dealing with dried specimens was so deceived by its resemblance to the capparids that he published it as a *Cleome*.[1] Nuttall and his fellow travelers, apparently tempted by the odor and flavor of the fresh herbage, cooked and ate it; but with after effects again indicative of decidedly capparideous therapeutic qualities, such as the aspect of the plant would have given warning of, but which the smell and taste seemed sufficiently to contradict.[2]

[1] *Cleome pinnata*, Pursh. Fl. ii. 739.

[2] See Nutt. Gen. ii. 72.

Analogies and Affinities.

III.

In preceding articles, I have here and there alluded to this circumstance: that systematic botanists whose theories of classification exclude the consideration of odors and flavors of plants, do nevertheless in practice now and then resort to them, and press them into service, for the more prompt recognition at least, if not for the more satisfactory delimitation of species, genera and orders.

Some telling examples of this occur in the history of the genus *Allium*. Within it are now comprised, according to the limits set to it by all authors now living, plants of extremely wide and varied organographical differences; such degrees of difference as are not allowed within one genus in any other tribe of endogenous plants. And while this is true, there are others formerly retained in *Allium*, which are now excluded from it, not because of any morphological disagreement whatsoever, but solely on account of their lacking what is known as the alliaceous odor and flavor.

Let us note, first of all, some of the more important and striking diversities of organic structure which the genus, as now received, exhibits. There are leaves narrowly linear and flat; leaves broad and carinate-complicate; leaves terete and solid; leaves terete and hollow. In this order of the vegetable kingdom, it is usual to found genera upon such distinctions as these; as also upon the character of scapes, as flattened and sharply two-edged; as terete and solid, or as terete and hollow; but the genus *Allium* is, as though by special license, permitted to include all these diversities of flower-stalk. As to the perianth, there are some sorts

with segments distinct, others with more or less conjoined segments ; besides some with petals like the sepals, and some with petals and sepals very dissimilar in size, form or attitude. In connection with the andrœcium one may note filaments wholly free from the perianth in most species, while in not a few they are more or less adnate ; and there are filaments filiform throughout ; filaments toothed below ; filaments subulate- or even triangular-dilated ; filaments widening upwards ; filaments petaloid-dilated, tricuspidate at the apex, the central cusp antheriferous ; and there are filaments cohering below, thus forming a second crown or tube within the perianth. And such differences as these are, elsewhere in the order, regarded as amply sufficient for the establishment of separate genera. In view of differences such as some of these, all botanists anterior to Haller, and many in more recent times, considered the Leeks, Onions and Garlics as of distinct genera ; recognizing species of *Porrum*, *Cepa* and *Allium*. Even Linnæus, not given to the accepting of genera without good characters, admitted these three without any hesitancy, until Haller taught that they could constitute but one natural genus.[2] But to Haller's view, even after it had been adopted by Linnæus, there were eminent authorities who could not subscribe ; and a long succession of men thus minded, was continued almost down to our own time.

At least three hundred species of these plants are now known ; and out of them have been selected the types of more than twenty proposed genera. The authorship of such proposed genera rests with botanists of such high standing as Tournefort, Adanson, Medikus, Mœnch, Salisbury, Lindley, Kunth, Reichenbach, Parlatore and several others of equally recognized ability. All these have seen, in the fusion of so many and such diverse types into one genus, a pronounced contradiction of those morphological principles on which all classification rests, or is presumed to rest.

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[1] See *A. dichlamydeum* and *crispum*. Pitt. i. 166.

[2] De Allii Genere Naturali Libellus. Gœttingæ, 1745.

But, notwithstanding the high authorities who have promulgated them, the several proposed alliaceous genera will apparently fail of obtaining a final general approval with botanists. They are to-day farther than ever from finding acceptance. The very comprehensive *Allium* of Haller, of Linnæus and of Bentham is, for now twenty years past, I believe everywhere received; this notwithstanding that no one has very openly expressed an opinion as to why, or upon what principles, such great diversities of vegetative and floral character may be admitted within a genus.

Without any doubt, that which, in the minds of so many botanists from Haller's time to the present, has overborne all organographic discrepancies, and has constrained them to retain one polymorphous genus *Allium*, instead of making three, or five, or twenty genera, has been nothing else but that peculiar sensible property which pervades the whole series of species. Yet, I say, such a proposition as that odors and flavors should sometimes be allowed to outweigh morphological considerations, has never been contended for; and the traditions of phytography are all against the idea.

Something over forty years ago Kunth, in the face of those axioms and traditions, but without apology for his action, picked out from the genus *Allium* as then received, something like a dozen species, all of which were unlike the rest in being wholly scentless, and made of them a new genus, *Nothoscordum*. In some of the species he found the segments of the perianth more coherent, in others the number of ovules greater than in any species of true *Allium*. But these morphological differences amount to almost nothing. The genus rests really upon that one negative characteristic, the total absence of the odor and savor of onions. And this formal admission of the peculiar odor into the generic character of *Allium*, has been at once approved by most botanists, is become the effectual defense of *Nothoscordum*, and has led to the establishment of at least one other scentless genus, the type

of which was once regarded as a species of *Allium*.[1] Even so conservative a botanist as Mr. Bentham adopted heartily, on these express grounds, both *Nothoscordum* and *Muilla*. I know of only one recent author who, in dealing with the alliaceous plants and their analogues, has held fast by the old principle of morphology or nothing, and has in word and deed ignored the matter of odor and savor in connection with them. I allude to Regel.[2] But he, by leaving it out of the account altogether, and abiding thus strictly by an effete Linnæan canon, has made his *Allium* to include something like a score of species which perhaps not one of his contemporaries, and very likely no future author, will ever agree with him in placing there. He will appear to have offered to the botanical world, instead of a natural genus, an artificial congeries of species, several of which will seem by no means nearly related to the generic type, though closely analogous to it. Not only *Nothoscordum* and *Muilla*, but *Hesperoscordum* and even *Bloomeria* are by this author consociated generically with the onions. All except the first mentioned of these agree in the possession of one character which one never meets with in any alliaceously scented plants, namely, a multiplicity of bracts at the base of the umbel, whereas the real alliums have a one- two- or rarely three-bracted spathe. The last two have their pedicels jointed under the perianth: a second character by which they are distinguishable from *Allium*. Again, the three have coated corms instead of the tunicated bulbs until lately assumed to be universal in *Allium*. But now, in California—the very region which furnishes the corm-bearing analogues of *Allium*—we have two strongly scented species of Onion that are quite anomalous in their genus by their having corms and not bulbs. These are *A. unifolium* and *Bolanderi*; and, although their corms are peculiar, and unlike those of *Muilla* and its allies, the odor

[1] *Muilla*, S Wats, Proc. Am. Acad. xiv. 215; Benth. & Hook. f. Gen. Pl. iii. 801; Greene, Pitt. i. 73, 165.

[2] Alliorum adhuc Cognitorum Monographia. E. Regel, Petrop. 1875.

of the herbage as much as anything prevents their exclusion from *Allium;* for the characteristics of subterranean organs are of high significance in the classification of liliaceous plants. It is running counter to established principles to admit corm-bearing and truly bulbous species into the same genus.

Between our great cormose *Allium unifolium* and the far more common plant, *Hesperoscordum lacteum*, there subsists a much closer analogy than that of their subterranean organs: one well deserving notice under this heading. It is that of a remarkable close likeness in both the inflorescence and the structure of the individual flower. Both plants are of about one size. The umbels are of about the same number of pedicels. The size of the perianth, the form and the expansion of the segments are the same in both; and even the stamens, with their broadly subulate filaments a little coherent below, are almost exactly alike in the two species of these very distinct genera. The Hesperoscordum is a very common plant in California; the Allium while no rarity in its special localities is not often met with. One may botanize in its district season after season without once meeting with it. I remember well that when I first came upon it, I paused in admiration of what I took to be a rose-purple variety of the familiar *Hesperoscordum lacteum;* and only upon plucking a cluster of the pretty flowers and thereby setting afloat the quite unexpected onion smell, did I recognize, or even think of, the genus *Allium.* This different color in the flowers is the only note by which, at a glance, the growing plant in question may be known from its milky white analogue. But there is a variety, or subspecies, not hitherto published, in which the flowers are white.[1]

[1] ALLIUM UNIFOLIUM, VAR. LACTEUM. Notably less tall, more stout and succulent than the type, and somewhat glaucous: perianth-segments and filaments decidedly broader, shorter, and of thicker texture: all parts of the flower clear white, except the greenish midvein of the segments.—Collected in San Luis Obispo County, California, by Mr. Lemmon; perhaps replacing the type of the species in those southerly districts, and something more than a mere albino state of it.

Doubtless the most universal organographic mark of *Allium* is the bivalve marcescent-persistent spathe; and the plants which Regel seems to have placed in this genus with most reluctance are those which eminent authorities had regarded as of a distinct genus, *Nectaroscordum;* for here the spathe, albeit bivalvate, is herbaceous and deciduous. To this very pronouncedly generic character are added, pedicels turbinate-dilated at apex which receive and partly enclose the base of the ovary, and seeds inserted on the broad bottom of the cell instead of the usual axial placenta. In higher orders of even exogenous plants, where more in the way of character is requisite for the establishment of a genus than among endogens, such an insertion of ovules would alone be sufficient. We have a good instance of this in Robert Brown's *Leptarrhena*, separated from *Saxifraga* on just this ground: and it is a genus which I believe no one has yet called in question. If a merely basal placentation alone make a thoroughly valid genus in Saxifragaceæ, much more should it have that force in Liliaceæ. Lindley, in proposing *Nectaroscordum*, makes upon it this very philosophical remark in defense of his proposition. "It has been hitherto referred most unaccountably to *Allium*, with which it agrees indeed in having an umbellate inflorescence, and a powerful garlic-like odor, but in hardly any other respect more than *Ornithogalum*, and the other genera of the Liliaceous order. The characters assigned to it are amply sufficient to fix it as a most distinct and remarkable genus."[1] According to Bentham,[2] Parlatore also made of it a new genus, *Trigonea*, a little later, and apparently without knowing what Lindley had done. But, as before the days of Lindley and Parlatore this plant's garlicky odor had with botanists overborne all the force of its most pronounced morphological characters. and had kept it within the genus *Allium*, so it has done again latterly; and this notwithstanding the logical and philo-

[1] Bot. Reg. xxii. under t. 1913.

[2] Gen. Pl. iii. 804.

sophical protestations that have been made against that view. Regel, and also Bentham, remand *Nectaroscordum* to its old place under *Allium;* and there it is likely to remain. Such deference is and will be paid to an odor and a flavor, and, as we think, rightly.

In remarking upon the peculiar sensible property of *Allium*, Bentham says that this odor is elsewhere among the Liliaceæ encountered only in the genus *Tulbaghia* and in one species of *Brodiæa*. The "Brodiæa" which he has in mind must needs be the Chilian *Triteleia uniflora*, Lindl. But this plant, having a tunicated bulb and an univalve spathe, is in no wise reconcilable with *Triteleia* proper, or with *Brodiæa*. It belongs rather to Lindley's *Leucocoryne*;[1] and these are mere South American onions whose perianths very closely imitate those of the North American *Brodiæa* and *Triteleia* types. They are not at all closely related to them. *Tulbaghia*, a south African genus, proclaims itself next of kin to *Allium* by its bivalve spathe as well as by its sensible properties: but in this genus the subterranean stem appears to be neither a bulb nor a corm, but something more like a woody rhizome.

We have within the borders of the United States one other genus which is strongly alliaceous, namely, *Androstephium*.[2] And this agrees with *Allium* in all its vegetative characters, even to the spathe. Its flowers are different; yet not so very different but that the admission of the species into *Allium* would still leave that genus less polymorphous in even floral character than is the *Hookera* of Pacific North America, especially if *Seubertia*, *Calliprora* and *Hesperoscordum* be included in it.

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[1] LEUCOCORYNE UNIFLORA = *Triteleia uniflora*, Lindl. Bot. Reg. t. 1921.

[2] The two known species are ANDROSTEPHIUM CŒRULEUM = *Milla cærulea*, Scheele, Linnæa, XXV. 260 (1852), *A. violaceum*, Torr. Bot. Mex. Bound. 219 (1859), and A. BREVIFLORUM, Watson, Am. Nat. vii. 303.

On Some North American Ranunculi.

R. ACRIFORMIS, Gray, Proc. Am. Acad. xxi. 374 (1886). Stems one or several, from a cluster of coarse fibrous roots, a foot and a half high, strictly erect: leaves long-stalked, erect or ascending; the short-stalked leaflets divided into long linear callous-tipped segments and lobes, faintly canescent with a light appressed silky pubescence: flowers and fruit much as in *R. acris*.

Rarely collected, this fine species abounds in damp meadow lands along rivers and brooks from the high plains of Wyoming northward and westward in the cold elevated districts. Late in July last year I obtained it at Laramie in good fruit; the flowering season for it being nearly past at that time.

R. REPENS, Linn. Sp. Pl. 554. This, not hitherto known on the Pacific Coast, has been sent me from Humboldt County, California, by Mr. C. C. Marshall, who finds it abundant about a certain pond near Arcata. Not having found any trace of it except in the single locality, he infers that it may be an introduced plant; which is very likely.

R. RUGULOSUS. Perennial, slender, apparently weak and decumbent or reclining, 1½ to 3 feet high, nearly glabrous: leaves pinnately about 5-parted or -divided, the divisions cleft or divided into long linear or lanceolate segments: sepals reflexed: petals 7 to 11, spatulate-oblong, ½ inch long: head of achenes slightly depressed-globose: achenes rather few, barely a line long including the short recurved style, the sides faintly rugose-reticulate.

The type of this new species is a very slender but tall plant from the Chowchilla Mountains in the eastern part of

south-central California, where it was collected in 1875 by Mr. F. P. McLean. In this the segments of the cauline leaves are narrowly linear. In a larger plant from the plains near Visalia, in the same general district, obtained by Dr. T. J. Patterson, March, 1886, the segments are broad. Mr. McLean's specimens are labeled, in his handwriting, *R. recurvatus*; but the species is most related to *R. Californicus*, from which, in view of the somewhat pitted and rugose achenes and different habit, it is necessary to separate it.

R. SUBSAGITTATUS. *R. Arizonicus*, var. *subsagittatus*, Gray, Proc. Am. Acad. xxi. 370 (1886). Two feet high, erect and stout, softly villous, the pubescence somewhat deciduous: the later radical leaves 2 or 3 inches long, cordate-oblong or the basal lobes subsagittate, the earlier smaller and cordate-orbicular or but little elongated, all coarsely and somewhat regularly toothed; the cauline few and cleft into linear segments: sepals spreading, almost caducous: petals oblong-obovate, more than $\frac{1}{2}$ inch long: head of achenes oval or oblong: achenes thick-lentiform, rather acutely margined, pubescent, a line long exclusive of the slenderly subulate short straightish style.

In moist lands along streams in the open plains at the base of Mt. San Francisco, northern Arizona. I had this plant in very imperfect state from Dr. Rusby who obtained it in 1883. Later Mr. Lemmon has distributed it as the type of his *R. Arizonicus*. He tells me that this is what he sent to Dr. Gray for the type of that species; and I have recently sent out two or three specimens of my own collecting last year under the name "*R. Arizonicus*, Lemmon." While it is undoubtedly the most strikingly distinct Ranunculus of the three forms published by Dr. Gray under the specific name of *Arizonicus*, it is not what he took for the type of that species. It is in general a much larger plant than he supposed, and has a differently shaped head of achenes; for it is seldom or never nearly "oval." Dr. Rusby's specimen above referred to differs from those of Mr. Lemmon and

from mine in being of less robust growth, in petals of less than half the size, and the margin of the leaf is crenate rather than dentate. In all these respects it makes an approach to *R. affinis ;* and, with botanists who are not averse to recognizing subspecies in nomenclature, both this and the following might go in as subspecies of *affinis ;* to which they are closely allied, but are far more than mere varieties.

R. Arizonicus, Lemmon, in Gray, l. c. As above hinted, this plant looks a good deal more like ordinary Rocky Mountain *R. affinis* than does the preceding. It is nevertheless of a different mode of growth, and may well be distinct notwithstanding the failure of the character on which Dr. Gray appears to have placed most reliance. He says the heads of achenes are "globular." In only one of my specimens do I find even an oval head. All the rest are more elongated than that. And as for the "acute margins" of the achenes, they are almost as much so in many a specimen of *R. affinis* from Colorado. In leaf-outline and dentation this plant makes no approach to *R. subsagittatus ;* and its habitat is away up at timber line, along with *Primula Parryi, Geum Rossii* and other such plants, while the extensive tracts between the two have no Ranunculus at all.

R. Arizonicus, var. subaffinis, Gray, l. c. In the course of a long experience with Ranunculus forms in the West, I have learned to make less than I was taught to make of the lateral diameter and the acuteness of the margin of an achene. I should therefore have left this plant under the name *R. affinis ;* although it is more slender, and smaller-flowered than the Colorado plant. Dr. Gray left it to be inferred that its heads are globular. So far from that, they are as nearly cylindrical as can be : quite like those of ordinary *R. affinis.* On the San Francisco Mountain (which some recent explorers and visitors affect to call Mt. Agassiz) it grows along cold subalpine brooklets where it is associated with *Mertensia Sibirica, Primula Parryi,* etc.

R. OBTUSIUSCULUS, Raf. in Desf. Journ. Bot. i. 225 (1808) *teste* A. P. DC. Syst. i. 302 : *R. laricaulis*, Darby, S. Flora, 204 (1855) : *R. ambigens*, S. Wats. Bibliogr. Ind. 16 (1878). American authors of the last twelve years who have helped to give currency to the name *R. ambigens* will find, upon examining the above references (both omitted from the Index), that as a species distinct from *R. Flammula*, it had names enough before 1878. *R. ambigens* is quite clearly antedated by *R. laricaulis*, Darby, judging from Darby's description ; and that, very probably yields to the *R. Robini*, Raf. (1817) ; but again, there can be no doubt that Rafinesque's still earlier *R. obtusiusculus* is the oldest name for the species. The specific character, though brief, is sufficient when the habitat "marshes of New Jersey" is taken into consideration. Certainly no other Ranunculus with lanceolate leaves was ever found in New Jersey but this. And the name *obtusiusculus* is manifestly taken from the little abrupt blunt tip of the lanceolate acuminate leaves.

R. OVALIS, Raf. in Desf. Journ. Bot. ii. 268 (1814) : DC. Syst. i. 302 (1818), Prodr. i. 43 ; Graham. Edinb. Phil. Journ. 1829, p. 188 ; Don. Gen. Syst. i. 33 (1831) ; Hook. Fl. Bor.-Am. i. 12. t. 6. fig. B. (1833) ; Walpers, Rep. i. 42 (1842) ; Lawson, Revis. Canad. Ran. 52 (1884) : *R. rhomboideus*, Goldie, Edinb. Phil. Journ. vi. 329. t. 11. fig. 1 (1822) ; Richardson, App. Franklin Journ. 13 (1823) : Hook. l. c. ; T. & G. Fl. N. Am. i. 18 (1838) ; Gray, Man. ed. i. 9 (1848), and Proc. Am. Acad. xxi. 371 (1886) ; Wats., Gray's Man. ed. 6. 42 (1890) : *R. brevicaulis*, Hook. Fl. i. 13. t. 7. fig. A. (1833) ; T. & G. Fl. i. 18.

The above bibliography is only quoted, in the main, from Professor Lawson, whose admirable Revision of Canadian Ranunculaceæ, although doubtless ranking first among all botanical monographs hitherto published in North America in point of careful and thorough elaboration directed by supereminent scholarship, has been strangely ignored by American authors who have subsequently handled the subject

of American Ranunculi. No critical student of these plants will long entertain a doubt of the identity of *R. rhomboideus* and *oralis*; and the priority of the latter name is great, unless the *rhomboideus* of Rafinesque be concluded to be the same as his *oralis*, both of which were published in the same year. And, in that case Rafinesque's authorship of the name *rhomboideus* long antedates that of Goldie. Dr. Gray in his latest notes wrote *R. rhomboideus*, Raf., but with a mark of doubt. *R. oralis*, Raf., for the same plant should be used because there is no doubt about it. Dr. Gray also remarked that *R. brevicaulis* of Hooker seemed to be a depressed form of the same species. It is not so much as that. It is merely the early state of a plant which always unfolds its earliest blossoms almost before the stem begins to grow, attaining even its medium height only some weeks later. I speak from long acquaintance with the plant as it grows in regions just to the westward of the Great Lakes, where it is almost the earliest flower of spring, appearing as a mere dwarf, in March or April, and afterwards undergoing remarkable changes of size and aspect in every individual.

R. LACUSTRIS, Beck & Tracy, in Eat. Man. ed. 3, 423 (1822), Ibid. ed. 4, 424 (1824), ed. 5, 359 (1829), ed. 6. 298 (1833), ed. 7, 477 (1836): Beck, Bot. N. & Mid. States, 9 (1833); Paine, Catal. Oneid. Co. 130 (1865); *R. multifidus*, Bigel. Fl. Bost. ed. 2, 228 (1824) and of Gray Man. ed. 5, 40 and ed 6, 41, excl. var. *terrestris*, perhaps not of Pursh (1814), certainly not of Forskaal (1775): *R. Purshii* in part of many authors. beginning with Richardson (1823).

Stem stout, hollow, from two to four feet long, growing in deep water: leaves submersed, short-petioled, ternately cleft into innumerable linear-filiform segments: inflorescence contracted, leafless, scarious bracts subtending the short fistulous peduncles: flower buds submersed: sepals thin (not reflexed?), apparently caducous; corolla bright yellow, nearly an inch wide: head of carpels globose: body of achene $\frac{3}{4}$ line long, lower half of the margin conspicuously callous- or corky-

enlarged, the sides tuberculately or somewhat rugosely uneven, beak $\frac{1}{2}$ line long, ensiform, straight or a little incurved.

The species thus described was published by Messrs. Beck and Tracy in the belief that it was distinct from *R. multifidus* of Pursh. I begin to think that their opinion was correct; and unless the western plant, Pursh's type (the *R. multifidus* var. *terrestris*, Gray), shall be found to exhibit those characters of the fruit which I here indicate and which have not heretofore been discovered, then the judgment of the author's of *R. lacustris* will be thoroughly substantiated.

As for the name itself; there is no North American *Ranunculus* to which the specific adjective *multifidus* may rightly be assigned. Forskaal's Arabian species of that name, unheard of by Pursh in 1814, dates from 1775.[1] It has been assumed that *R. Purshii* of Richardson either antedates or is as early as *R. lacustris*. Both Asa Gray and Professor Lawson have given the year 1823 as the date of the latter name; and the former is undisputedly of that year. But my copy of the Third Edition of Eaton's Manual bears the date 1822; and this I find verified by a foot-note to page 359 of the Fifth Edition, wherein the author says: "In 1822 I published the *lacustris* in the name of Beck and Tracy." It may well be that in 1823 a second thousand copies of the Third Edition were printed, the date alone being changed. In the Preface to the Eighth Edition of the work the author remarks that, of the five preceding editions, two thousand copies each had been called for. Anyhow, it is manifest that *R. lacustris* is of the year 1822, and therefore a year prior to *R. Purshii*; and this is my new point in the bibliography of the matter. It seems possible that the western type of Pursh may be identical with an Asiatic species which bears the name *R. Gmelini* DC. (1818).

It is worthy of remark that no one has yet stated whether *R. lacustris* be annual or perennial. Probably nobody

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[1] Forsk. Fl. Ægypt.-Arab. 102.

knows; and it is time that the life history of so fine a plant should be looked into by some one who has it within his reach.

The species has not been credited to California, nor was anything like it found at all near the borders of the State, until two years ago, when precisely the New York and New England type, the specimens just matching those from Lake Champlain, came in from Humboldt County, where they had been collected by Messrs. Chesnut and Drew, of the University of California. The occurrence of just this type so near the shores of the Pacific becomes the more remarkable when we consider that it is otherwise unknown to the westward of Wisconsin and Minnesota; all the formerly so-called "*R. multifidus*" of the far western regions being referable to *R. natans* and *R. limosus*.

R. NATANS, C. A. Meyer, in Ledeb. Fl. Altaica, ii. 315 (1830), Fl. Ross. i. 34 (1842); Gray, Proc. Am. Acad. xxi. 366 (1886): *R. Purshii* partly of many authors: *R. hyperboreus*, var. *natans*, Porter, Fl. Colo. 3.

This is a variously creeping or floating, but not submersed plant, of wide range from the middle altitudes of the Colorado mountains far northward. It was of course long mixed up with the so-called *R. multifidus*, from which its achenes small and numerous, with a very short cylindrical style should always have made it readily distinguishable. The restoration of it to its proper specific rank was made late by Dr. Gray.

R. LIMOSUS, Nutt. in T. & G. Fl. i. 20 (1838); Walp. Rep. i. 42: *R. multifidus*, var. *limosus*, Lawson, Rev. Ran. Canad. 47 (1884).

This, which appears to have been at last referred by Dr. Gray to the preceding, is clearly distinct, as I had good opportunity of learning while on its native soil last summer. It is seldom creeping in habit, usually assurgent, only the lower joints rooting. The leaves are orbicular, quite large, cleft into broad divisions and subdivisions, and

the whole plant is soft-villous. The flowers are a half-inch broad, and the very small achenes have a short subulate style. The habitat of the plant is peculiar. It belongs to a much lower altitude than *R. natans*, and grows with *R. sceleratus*, in the soft or half-dried mud of brackish lake-shores on the plains of Idaho and Utah. I obtained it in July last, on the muddy shores of Bear Lake, near Montpelier, Idaho, and along with it the following :

R. LIMOSO × SCELERATUS. Parted to the base into many ascending or ultimately reclining branches a foot or two in length ; sparsely villous throughout : leaves round-reniform. parted into 5 to 7 cuneate-obovate cleft and coarsely toothed segments : profusely flowering, the corollas ½ inch wide : achenes none (the plants all wholly sterile). A beautiful hybrid, very manifestly of the parentage indicated, both species abounding together in the locality.

SCHIZONOTUS AND SOLANOA.

In the opinion of recent authors who have given special attention to Spiræaceous plants, Linnæus' eleven species of "*Spiræa*" represent seven distinct genera. Four of these genera, *Aruncus* (under the name of *Barbacapræ*), *Filipendula*, *Spiræa* and *Ulmaria*, were pre-Linnæan and had received the important sanction of Tournefort. The fifth was the *Gillenia* of Mœnch, proposed in 1802 ; its type the *Spiræa trifoliata* of Linnæus. I believe the next subtraction of this kind was made by Lindley who in 1830, apparently simultaneously in the Botanical Register and in the Introduction to the Natural System, insisted that the Linnæan *Spiræa sorbifolia* was thoroughly *sui generis*, and proposed for it

the name *Schizonotus*.[1] The initiative leading to this had indeed been taken by Seringe five years before; for he had made of the shrub a subgenus, Sorbaria, of *Spiræa*.[2] Between the years 1832 and 1838, in the Atlantic Journal, New Flora, and Sylva Telluriana, Rafinesque not only reiterated Lindley's teaching regarding *Spiræa sorbifolia*, but he advanced every idea which has since been set forth by Maximowicz and adopted by others, in the way of dismembering the old *Spiræa*. He is apparently quite unaware that Lindley has preceded him in the *S. sorbifolia* matter. This is evident from two circumstances. He makes of *S. sorbifolia* the genus *Basilima*; and then, upon the *Spiræa discolor* of America, he founds a *Schizonotus*.[3] The celebrated paper by Maximowicz[4] which is so completely carrying the day in favor of everything which Rafinesque proposed more than forty years before him, I have not seen; but from various reviews and abstracts of it I infer he was unacquainted with what Rafinesque had done. However this may be, it is clear that the *Schizonotus* of Lindley must displace the *Basilima* of Rafinesque and the *Sorbaria* of Maximowicz; also that it nullifies the several years later *Schizonotus* of Rafinesque: so that Maximowicz's *Holodiscus* is free, and entitled to that currency which it is gaining.

But since the *Sorbaria* of this author is antedated by Lindley's *Schizonotus*, there must follow a change in the name of a certain Californian genus. In the year 1876, upon an Asclepiadeous type which had been sent him by the present writer in 1874, the late Asa Gray offered a second homonym of the Lindleyan Spiraeaceous genus. In publishing this, which became the third *Schizonotus* attempted, he made no allusion to the two earlier applications of that name. He had probably forgotten all about them; if indeed he had

[1] Intr. to Nat. Syst. ed. 1. p. 81: Bot. Reg. xvi. under t. 1365.

[2] DC. Prodr. ii. 545 (1825).

[3] Fl. Tell. 151 & 152 (1838); perhaps earlier, in New Flora, or Atl. Journ.

[4] Adnotationes de Spiræaceis (1879).

ever taken coguizance of the fact that Rafinesque had used the name.

For this latest and surely untenable *Schizonotus* I offer as a substitute the name

SOLANOA.[1]

SCHIZONOTUS, Gray, Proc. Am. Acad. xii. 66 (1876), not of Lindley (1830), nor of Rafinesque (1838); the only known species being

S. PURPURASCENS. *Gomphocarpus purpurascens*, Gray, Proc. Am. Acad. x. 76 (1874): Bot. Calif. i. 477 (§ Schizonotus): *Schizonotus purpurascens*, Gray, Proc. Am. Acad. xii. 66; Syn. Fl. i. Part 2. 100.

NEW CALIFORNIAN PLANTS.

BY J. G. LEMMON.

PRUNUS SUBCORDATA, var. KELLOGGII.[2] Usually 6 to 12 feet high, the young shrubs with ascending branches, the older

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[1] The name of the celebrated Catholic Missionary Francisco Solano was given to one of the early Californian Missions. The first Christian chief of the aboriginal tribes inhabiting the western side of the Sacramento valley and collectively denominated the "Suisunes" took Solano as his baptismal name. The residence of Solano was in the Suisun valley, a part of the present Solano County, California, near the borders of which, probably within which, occurs the plant Solanoa.

[2] This variety has been well known and always popularly distinguished from the type, ever since the early days of immigration to California from the eastward. Dr. Kellogg described it, though without giving it a varietal name, as early as 1859, in Hutching's Magazine, page 7 of Volume V. See also Wickson, Calif. Fruits, p. 50. E. L. G.

flat-topped: foliage nearly glabrous, orbicular or elliptical, not at all cordate at base, crenulate-serrulate, about 1½ inches long, the slender petioles about ½ inch, the 2 to 4 glands either at summit of these or upon the base of the lamina: fruit an inch long, or more, ovate, yellow when ripe, the sarcocarp more pulpy and better flavored than in the type.

The typical *P. subcordata* is a smaller shrub, of stouter habit, with pubescent subcordate foliage, blackish bark on the branchlets (it is ash-gray in the variety), and smaller almost oblong or roundish dark red fruit, the pulp of which is harder and less palatable.

The variety is abundant near Sierra City, Sierra Co., Calif., where along with the type the writer has observed it almost annually since 1867. It prevails generally in the more northerly parts of the State, and has long been observed and its superior qualities noted by my friend Mr. Sisson, of Strawberry Valley at the base of Mt. Shasta, where it grows plentifully along streams that course through rich meadow lands.

ARCTOSTAPHYLOS PARRYANA. A much branched shrub, 3 to 5 feet high: foliage coriaceous, bright green; blade ovate or oblong ½ to 1 inch long, acute or obtuse, entire, conspicuously impressed veiny; petioles slender, ¼ to ⅓ inch long: inflorescence paniculate-corymbose, the pedicels and bracteoles white-tomentose: bracts foliaceous, narrow; bracteoles 2 or 3 lines long, deltoid, with callous tips: segments of the rotate calyx obtuse: fruit ovate or globose, ¼ to ⅓ inch long, yellowish; exocarp smooth and glabrous, rather thin; endocarp of from 5 to 7 firmly united bony carpels, apiculate at each end, and marked with longitudinal ridges corresponding with the back of the carpels: seeds 2 lines long, incurved, white.

Found by the writer, on the Tehachapi Mountains of south-central California, four miles west of Keene Station, June, 1888. and affectionately dedicated to my friend the late Dr. C. C. Parry, one of the pioneers of the botany of southern

California, who had done much for the advancement of our knowledge of the Manzanitas, as well as of Ceanothi and other genera.[1]

The species while presenting much of the appearance of Dr. Parry's *A. Manzanita*, is more related to *A. glauca* by its consolidated carpels and elongated fruit.

ALLIUM OBTUSUM. Bulbs small, the coats with nearly rectangular reticulations, scape short (2 or 3 inches), slender, striate, exposed portion reddened; leaf solitary, twice as long as the scape, 2 or 3 lines broad, usually falcate; bracts 3, oblong-elliptical, acuminate, about equalling the pedicels: the latter numerous, 2 to 4 lines long: flowers roseate, the segments oblong, obtuse, with broad greenish midribs: capsule with 6 short acute crests.

Near to *A. Neradense* and also to *A. tribracteatum*, but abundantly distinct by its oblong obtuse perianth segments and solitary leaf. Rare in the sub-alpine region of Gold Lake, Plumas County, June 26, 1889.

NEW OR NOTEWORTHY SPECIES.

VII.

SISYRINCHIUM DEMISSUM. Low, the rigidly erect ensiform leaves 4 to 8 inches long, prominently striate, serrulate-scabrous above: stems slender, little surpassing the leaves; peduncles 2, about equalling the bracts: spathes of 2 sub-

[1] This species must needs be that of which Dr. Parry showed me some specimens more than a year ago as having come from some southeastern part of the State, and as being undescribed. Mr. Lemmon's name has therefore a natural appropriateness.—E. L. G.

equal bracts: flowers very small (barely $\frac{1}{4}$ to $\frac{1}{3}$ inch wide), pale blue, the segments obtuse and cuspidate: capsule obovoid, about 30-seeded: seeds minute, rounded or obovoid or even somewhat reniform, the surface marked with elevated crowded sinuous rugosities.

As different from the common blue-flowered species in aspect as in character. Discovered by the writer, in moist meadows at the base of Bill Williams Mountains, Arizona, and also near Flagstaff, July, 1889.

Sisyrinchium anceps, Lam. Encycl. i. 403 (1783); Cav. Diss. vi. 345 (1790). This species, although not before credited to western districts (*S. mucronatum* replacing it in the Rocky Mountain region), is to be added to the list of Californian plants. It appears to be rather common on the westward slope of the Sierra Nevada at considerable altitudes. I collected it some years since at the Soda Springs near Summit Station; also last year in moist meadows near Tehachapi. Mr. Lemmon too has brought it to me from some other mountain locality as being a plant which he could not identify. The coast species, *S. bellum*, is fairly distinct, differing, however, more in habit, geographical range, and the size of the flowers and seeds, than by any stronger characters; though its seeds are less deeply pitted than in *S. anceps*.

Calochortus Plummeræ. Near *C. splendens*, but larger: sepals erect: petals as broad as long, distinctly unguiculate, forming a campanulate cup, the lamina of a rich red-purple, more than half its surface ornamented with orange-colored hairs, the gland near the base densely ciliate: anthers oblong-lanceolate, obtuse, mucronulate, $\frac{1}{2}$ inch long, on filaments of an equal length: ovary long and narrow, almost equalling the petals.

Mill Creek Canon, San Bernardino Co., Calif.; first collected by Mr. Lemmon in 1876, and also brought from the same region more recently by him and his wife, Mrs. S. Plummer Lemmon, to whom it is dedicated. Mr. Parish has also lately

sent me the plant as being of an undescribed species. It is widely different from *C. splendens* in many points, among which the most notable are the erect (not recurved) sepals, the densely yellow-hairy petals, the long stamens and pistil, and, to the observer of the living plant, the tulip-like shape of the whole flower, *i. e.*, broad at the base.

CALOCHORTUS INVENUSTUS. Near *C. splendens*, but sepals not recurved, oblong-lanceolate with a narrow scarious margin: petals cuneate-obovate, of a dull somewhat greenish or livid white, glabrous except a few scattered white hairs near the base, the short claw and the small lanceolate curly-hairy gland purple: filaments shorter than the anthers, these oblong-linear, truncate at apex, slightly sagittate at base.

A homely species of the higher mountains to the westward of the Mohave Desert, where it was collected by the writer, June 25, 1889. But for the very different character of its gland it might pass for a smaller flowered *C. Gunnisoni*.

CALOCHORTUS EXCAVATUS. Resembling the last, but the bracts ovate-lanceolate, scarious almost to the striate-veined middle portion, their acuminate tips recurved: petals white shaded with lurid purple above, but dark purple below and about the broad obovate hairy gland which is deeply impressed, appearing like a yellow saccate body on the outside of the petal: stamens as in the last, but anthers dark maroon.

From Bishop Creek, Inyo County, California, collected by Mr. W. H. Shockley (No. 427).

CALOCHORTUS (CYCLOBOTHRA) AMŒNUS. Near *C. pulchellus*, of the same size and habit, petals more elongated, the ciliation longer, more lax and scarcely carried above the middle of the organ, the whole flower of a deep red-purple.

My only specimens of this distinct and most beautiful species were sent from the mountains east of Visalia, California, in 1886, by Dr. T. J. Patterson. I had put them aside for future study without having noticed the shape of the

corolla; and to this my attention has lately been called by a good painting of what must be the same species, made by my friend Mrs. Rawson Peckinpah who resides in almost this very region whence I had my specimens, and by whose painting the beautiful *Collomia Rawsoniana* first came to my knowledge.

DODECATHEON PAUCIFLORUM. *D. Meadia*, var. *pauciflorum*, Durand, Pl. Pratten, 95 (1855), as to plant of Rocky Mts.: *D. Meadia*, var. *alpinum*, Coult. Rocky Mt. Bot. 233, as to Rocky Mt. habitat only: *D. Meadia*, Porter, Fl. Colo. 90, not of Linn.: *D. integrifolium*, Nutt. Gen. i. 119, as to plant from sources of Missouri: *D. integrifolium vulgare*, Hook. Fl. Bor.-Am. ii. 119, also *D. integrifolium* of Bot. Mag. t. 3622, not of Michx.

The short perpendicular crown solitary, simple, producing neither bulblets nor offsets: herbage glabrous, glandless, the leaves deep green, entire, not depressed but suberect, $\frac{1}{4}$ or $\frac{1}{3}$ as long as the tall scape: bracts of the few-flowered umbel lanceolate: segments of corolla rich lilac-purple, the undivided part (everted tube) yellow, with a narrow scalloped ring of deep purple midway between the base of the segments and the stamen-tube: stamen-tube often nearly as long as the anthers, yellow; anthers purple: capsule crustaceous, $\frac{1}{2}$ inch long, slender, nearly cylindrical, acute, opening by 5 short teeth.

The fruit of this common Rocky Mountain Dodecatheon was not known until I obtained it last year. The capsule is quite different from that of *D. Meadia* in form as well as in texture. The leaves of the plant are also much smaller relatively to the scape, of a firmer texture and of a deeper green than in the type of the genus: besides, the markings of the corolla are thoroughly dissimilar in the two. By European authors it has always been considered wholly distinct from *D. Meadia* and has passed with them for the *D. integrifolium* of Michx., but no doubt erroneously, for the gap is too wide, geographically and climatically, between the

"southern Alleghenies" whence true *D. integrifolium* was derived, and the Rocky Mountains.

D. pauciflorum has a wide range, occurring in middle elevations of the mountains from New Mexico, through Colorado, Wyoming and Montana and, according to Hooker, far northward in the British Possessions. Westward it is found in eastern Oregon by Mr. Cusick, who distributes it as "*D. Jeffreyi*, the dwarf form"; but his specimens have little in common with the plant which Dr. Gray designates as *D. Jeffreyi*. I also refer here Mr. Macoun's plant from "Morley, June 12, 1885," besides two sets of specimens from Vancouver Island by the same botanist, a tall plant from "Cedar Hill, May 26, 1887," and a dwarf state obtained on "Mt. Arrowsmith, July 17, 1887." The capsule in these far-western plants is less elongated than in the Colorado and Montana type, and the bracts of the involucre as well as the pedicels and calyx are finely purple-dotted.

I may designate as var. MONANTHUM of the present species, a 1-flowered dwarf of eastern Oregon (Cusick's No. 1528), not more than 2 or 3 inches high, with stamen-tube quite as long as the anthers and like them of a very dark purple, the whole basal part of the corolla-tube of the same color, but separated from the lilac of the segments by a broad pale yellow band: capsules $\frac{1}{4}$ inch long, splitting readily to the base into 5 valves. This may easily prove distinct; but one wishes to know more of its habits, special location, etc.

DODECATHEON CUSICKII. Like the type of the preceding in subterranean characteristics: the whole herbage more or less viscid with a close glandular pubescence: leaves from coarsely dentate to entire: coloring of flowers as in the last, but stamen-tube shorter: pedicels numerous, turbinately accrescent and 10-striate under the mature capsules: these oval, acute, scarcely surpassing the calyx, completely 5-valved from the apex.

The type of this is Mr. Cusick's 1527, said to grow on dry mountain ridges of eastern Oregon, at an altitude of 4000

feet. The foliage of this is doubly toothed, *i. e.*, having coarse and salient primary teeth, with a smaller one in each sinus. It is far less glandular than some other specimens which I can not but place with it; and I have an almost perfectly glabrous and quite entire-leaved specimen, in flower only, but probably of the same species, collected in the blue mountains of Oregon, May, 1889, by Miss Bertha Anderson. But in Mr. Macoun's No. 3, from Lytton, British Columbia, April 17, 1889, recurs the toothed foliage of the type, along with a very marked viscosity of the whole herbage; while the same collector's No. 2, from Spencer's Bridge, is nearly as glandular, but the leaves are almost entire. The absolute characters of the species are the peculiar turbinate termini of the pedicels and the short capsule. These are represented in none but Mr. Cusick's specimens; but they preclude the merging of these forms in *D. pauciflorum*. Perhaps the more westerly plants here placed under that species, may prove referable to *D. Cusickii* when better known.

DODECATHEON CRENATUM. Rootstock stout, horizontal or ascending, short, simple or with a few branches, bearing coarse white fibrous roots beneath, and rather large bulblets above: leaves 6 to 10 inches long, oblong-lanceolate, tapering to a winged petiole, acute or obtuse at apex, the whole margin coarsely and regularly but not deeply crenate: scape 10 to 20 inches high, stout, bearing a many-flowered umbel: the stoutish pedicels and deeply parted calyx somewhat glandular-pubescent: flowers deep purple throughout: stamens distinct to the very base: capsule ovate-oblong, coriaceous, circumscissile near the apex, afterwards parting into 10 valves whose tips are closely recurved.

At and a little below the limit of trees on Mt. Rainier, Washington, in fruit only, 20 August, 1889: collected by the writer. Also seen in the herbarium of Prof. Henderson, from Mt. Hood. The species has the root-character in part, and also the gynœcium attributed to the obscure *D. frigidum*; but other plants are known to me which come much nearer to

the description of that species. The fruit characters of *D. crenatum* are excellent. The operculum though small (less than a line wide), is neatly severed from the body of the capsule except upon one side where, by one of the ten valves, it hangs at length inverted, as if by a hinge, not falling away until late. The large sub-alpine *Dodecatheon* of the Californian Sierras, whatever its specific name should be, has the same mode of dehiscence, but is in several points very unlike this its analogue of the high peaks of Oregon and Washington.

DODECATHEON HENDERSONI, var. CRUCIATUM. *D. cruciatum*, Greene, Pitt. i. 213. This, although of peculiar range, occupying as it does the whole of the territory sloping toward San Francisco Bay to the exclusion of true *D. Hendersoni*, is better placed as a variety of that species. But the tetramery of the flowers is constant; and so is the slender mode of growth, as well as the more elongated capsules, not to speak of the darker hue of the corolla. Both the variety and the type propagate by minute bulblets formed upon the crown; occasionally also by root-metamorphosis.

POLEMONIUM OCCIDENTALE. Stems two feet high, slender, solitary, erect from a decumbent base, arising from slender horizontal rootstocks running but little below the surface of the ground: herbage puberulent. the inflorescence somewhat viscid: radical leaves only 2 or 3, remote, each arising from a node of the elongated rootstock; cauline few and remote; leaflets in 7 or 8 pairs, ovate-lanceolate, acute: flowers few, nodding, in a strict thyrsoid raceme: corolla rotate-campanulate, $\frac{3}{4}$ inch broad, the segments acute: filaments linear-subulate, naked, equalling the corolla: anthers round-oval, retuse at each end.

I thus name and define as a probable species the "*P. cæruleum*" of the Rocky Mountains of Colorado, and of the Californian Sierras, not doubting that the rare plant of the northern Atlantic states catalogued everywhere as *P. cæruleum* will be found identical with this, when its characters

shall have been taken note of. In respect to subterranean characteristics our plant of the western mountains differs entirely from *P. caruleum* of the Old World and of our gardens, which has a taproot surmounted by a stout, short, simple or branching very leafy crown, this altogether above ground. It is possible that our *P. occidentale* may be specifically identified with some one of the subartic species which were published long since; yet it answers to the description of none of them. Even *P. acutiflorum*, to which it seems to come nearest, must, from the various accounts of it, be quite a different affair.

In the genus *Troximon* as presented in the Synoptical Flora a number of new species are defined, while at the same time there are several instances of the fusion of two, and even three, old ones in one. The case of this sort which is most glaring in the eyes of a botanist familiar with the plants on their native plains and mountains, is that of the "*T. aurantiacum*" of that work. The disentanglement may best begin with a draft of the characters of the true

TROXIMON AURANTIACUM, Hook. Fl. Bor.-Am. i. 300. t. 104. Nearly glabrous, deep green and not in the least glaucous: leaves oblanceolate, obtuse, entire, narrowed to a slender petiole: head small: ligules orange-color: achene tapering gradually to a short stout beak (not to a filiform stipe of the pappus), the pappus sessile.

This is frequent in dry open pine woods of the Colorado Rocky Mountains at 8000 or 9000 feet, but was first obtained from a more northerly locality. The figure of Hooker is excellent, except that the involucre is wrongly represented as having bracts somewhat united. They are, of course, distinct. Dr. Gray can not have had fruit of the following, or he would not have reached such a conclusion as that it should be a mere variety of *T. aurantiacum*.

TROXIMON PURPUREUM (Gray). *Macrorhynchus purpureus*, Gray, Pl. Fendl. 114 (1849): *Troximon aurantiacum*,

var. *purpureum*, Gray, Proc. Am. Acad. xix. 72 (1883); Syn. Fl. 438.

Sparsely lanate (under the involucre densely so) when young, in age glabrate, glaucous: leaves from linear to lanceolate, saliently or often runcinately toothed or lobed: outer bracts of the involucre short, oblong, obtuse, commonly dark brown at the tip: expanded head 1 inch wide, deep saffron-color (purple in the dry): achenes $\frac{1}{2}$ to $\frac{3}{4}$ inch long, the very slender beak as long as the body.

Common among the foothills of the Rocky Mountains in Colorado and New Mexico, either on open dry hillsides where it is low and depressed, or in long borders of meadows where it is erect and often two feet high. It is less related to the foregoing than to the next.

Troximon glaucum, Nutt. in Fras. Catal. (1813). Pursh. Fl. ii. 505 (1814); Nutt. Gen. ii. 128; Gray, Syn. Fl. 437, excl. var. *parviflorum*. *T. aurantiacum*. Gray, l. c. as to the synonym *T. roseum*.

Stouter than the last; leaves broader and less apt to be pinnatifid: outer bracts of the involucre as well as the inner elongated, lanceolate, acute: expanded head 2 inches broad, light yellow, often rose-tinted when fresh and changing to rose-red in the dry: achenes $\frac{1}{2}$ inch long or less, the stout nerved beak only half as long as the body; pappus as long as the achene, copious, flaccid and persistent.

A species of the very widest range geographically, and undergoing corresponding diversities of size; nevertheless, as extended by the author of the Synoptical Flora, probably embracing several species; for some of the plants placed along with it in the herbaria seem not to be glaucous, while others have peculiar pubescence; but the mass of collectors have practised the child's play of collecting flowering specimens and leaving the all-important fruits behind: so that no satisfactory discrimination of species or varieties can yet be made. Nuttall's *T. roseum*, belonging to the elevated plains of the far north, as well as to sub-alpine slopes in the

Colorado mountains, is but a dwarf state of this with flowers more rose than yellow; but all transitional shades occur; and it belongs to the whole genus to have either yellow flowers disposed to turn rose-red, in drying, or saffron-colored ones fading to a like shade under the same process.

In all the foregoing the crown of the root is simple, or nearly so, with the leaves scattered equably on all sides of it. In the first which follows, there is a totally different phyllotaxis.

TROXIMON PARVIFLORUM, Nutt. Trans. Am. Phil. Soc. vii. 434 (1841); T. & G. Fl. ii. 490. *T. glaucum*, var. *parviflorum*, Gray, Syn. Fl. 437.

Caudex multicipitous, the narrowly linear or broader and lanceolate leaves strictly 2-ranked, thus subtending the more or less decumbent scapes: whole plant nearly or quite glabrous: bracts of the involucre nearly equal, all lanceolate-acuminate: heads and achenes much shorter than in the last, the latter almost beakless; pappus less flaccid and more nearly approaching the deciduous.

I collected this last July on the Laramie plains where it is abundant and the only species; noting at the time the excellent vegetative characters, which the herbarium specimens also show. About Laramie the leaves of the plant are thoroughly grassy in their extreme narrowness and immunity from all indentation of margin. At lower elevations and further westward they are broader, shorter and often toothed: but by the important characters above noted the species is perfectly valid and one of the best.

TROXIMON ARIZONICUM. About a foot high, slender, glabrous except a woolliness under the involucre: leaves narrowly oblanceolate, entire or runcinately toothed: head more than an inch high, few-flowered, more than an inch broad when expanded; involucral scales in two series, the outer oblong, the inner lanceolate, all purple in the middle: ligules light

yellow: beak of the achene very much attenuate, longer than the body; pappus fragile and deciduous.

Mountains of Arizona and New Mexico; apparently referred by Dr. Gray to his *T. glaucum*, var. *laciniatum*, but the peculiarities of its involucre, achenes and pappus must undoubtedly exclude it from that species. It is more like *T. purpureum*, yet with floral characters of quite another order.

TROXIMON PLEBEIUM. Near *T. grandiflorum*, but the lanceolate leaves with a slender acumination and fewer teeth or lobes: heads very large and many-flowered, but ligules very short, suberect, deep yellow: achenes very small (in proportion to the size of the head, and of the whole plant), tapering abruptly to the long filiform stipe of the pappus.

Abundant in open grassy places along all the western side of the Mt. Diablo and Coast Ranges in middle California, where it is known locally as "*T. grandiflorum*," and whence it was distributed by the writer six or seven years ago to many correspondents, under that name. It is a very distinct species, easily recognizable as such, by its altogether inconspicuous flowers. The expanded head is less than an inch broad, the short ligules scarcely or not at all spreading, and almost concealed by the large bracts of the involucre. I long ago communicated to Asa Gray an account of these, and I perceive that the character "ligules short" ascribed to *T. grandiflorum* in the Synoptical Flora, was taken on my authority, both of us thus confusing two quite different plants. In true *grandiflorum*, common in the interior of California, and thence northward to the British boundary, the ligules are so long that the expanded heads measure two inches across, and even more. The achenes in this are exactly fusiform, and twice as large as in the homely *T. plebeium*.

DOWNINGIA TRICOLOR. Branches few, a span long, weak, tortuous and reclining: flowers few, upper lip of corolla very small, of two segments which are erect or slightly curved backwards but parallel; lower lip parted to below the middle

into 3 equal divergent broadly obovate truncate slightly cuspidate lobes, these deep blue at tip, white below, the base of the undivided part of the organ marked by a transversely somewhat quadrate spot of dark red-purple: genitalia wholly included within the turbinate tube.

Near *D. concolor* (Bull. Calif. Acad. ii. 153), but of different habit, with erect upper lip and very differently marked lower one. This and the following new Lobeliaceous plants were all discovered by the writer in fields of the lower Sacramento valley near Elmira, in the early part of May, 1890.

DOWNINGIA ORNATISSIMA. Erect, slender, 6 to 10 inches high, simple or branched from the base: tube of corolla abruptly raised into a sharp protuberance at base of the upper pair of segments, each of these abruptly deflexed and coiled backward into a complete ring: lower lip $\frac{1}{2}$ inch broad, parted into 3 divergent, broadly somewhat obcordate and slightly cuspidate segments; basal portion of the lip with 4 fold-like but very abruptly raised protuberances making the throat deeply 3-lobed: tips of the segments sky-blue and collectively circumscribing a broad somewhat quadrate field of white, this marked with a pair of obovate greenish yellow spots: genitalia exserted beyond the tube, and exposed by the abrupt deflection of the two upper segments.

The flowers of this are the dullest in the genus, as to coloring, and general effect when seen in a mass. The name alludes to the extremely and variedly ornate configuration of the corolla. The inflorescence is quite corymbose.

DOWNINGIA INSIGNIS. Stoutish, 6 inches high, erect, mostly simple and few-flowered: corolla large and elongate ($\frac{3}{4}$ inch from tip to tip of the two main divisions; lower lip $\frac{1}{2}$ inch broad) tube very short, campanulate; upper lip erect, merely bifid (cleft only $\frac{2}{3}$ down), the segments ascending and parallel; lower lip broadly obovate, 3-lobed at apex, the lobes and lateral parts of the body sky-blue marked with darker veinlets; main portion white, bearing 2 oblong parallel

green spots; the open throat disclosing a pair of bright yellow folds in the midst of a field of dark violet: genitalia long-exserted.

Related to the original *D. elegans;* but in that species the flowers are not half as large, the segments of the upper lip are cut completely to the base and are at length laid backwards one over the other forming a cross. The veining and dotting of the flower in *D. insignis* is very characteristic, and beautiful beyond that of any other species hitherto recognized.

HOWELLIA LIMOSA. Terrestrial, diffuse, the weak procumbent branches a foot long, leafy and racemosely floriferous throughout: leaves lanceolate, entire, sessile, $\frac{1}{2}$ inch long: pedicels filiform, 1 inch long: segments of the white corolla a line long, cuneiform, the two upper narrower and more widely separated: capsule clavate-oblong, $\frac{1}{2}$ inch long, scarcely constricted above, surmounted by the 5 triangular erect calyx-teeth.

In habit quite unlike the type of the genus; the herbage somewhat resembling that of the more slender Downingias; but the generic character of *Howellia* is abundantly confirmed in this most unexpected accession to the known flora of the lower Sacramento.

Contributions to North American Euphorbiaceæ.

II.

By C. F. Millspaugh, M. D.

1. Euphorbia Serpyllifolia, and its Forms.

Euphorbia serpyllifolia of Persoon has been one of the most puzzling species of the genus to those working over the districts which it inhabits; being a plant whose inherent nature seems to be to change slightly its characters in almost every station in which it is found. Of the large number of individuals in my herbarium from various situations west of the Mississippi, fully one-third of the labels bear a mark of doubt, after the specific name. In view of these facts I shall undertake to describe the species and its forms, with the hope that the result may render future nomination facile.

Persoon says in "Synopsis Plantarum," Vol. II., page 14 (1807): "74. SERPILLIFOLIA, *dichotoma procumbens, flor. solitariis axillaribus, fol. oppositis ovalibus retusis apice crenulatis, caps. conicis glabris.* Hab. in Amer. Calidiore. Herb. Thibaut. Parvula. †"

Were the prostrate species of *Euphorbia* few, and the distinctions between them greater, the above would describe the species amply. But in the light of so many prostrate *Anisophyllæ* it proves very vague indeed; hence I may be allowed the privilege of enlarging upon it, having a large collection, and a fragment of the original specimen to draw from.[1]

[1] Sent to the late Dr. George Engelmann by M. Boissier, from the herbarium of A. De Candolle, and kindly loaned me by Prof. Wm. Trelease, from the herbarium of the Shaw School of Botany, St. Louis. The ticket bears the word "Mexico," which with "Amer. calidiore" is all the indi-

EUPHORBIA SERPYLLIFOLIA, Pers. Glabrous. Prostrate or ascending, dichotomously branching; stems terete, or more or less angled (in the type almost winged); stipules setaceous or lacerate, triangular at the base; leaves short petioled, oblique at the base, blade varying from spatulate to oblong or obovate, apex truncate or retuse and more or less crenulate serrate. Inflorescence solitary or in loose leafy clusters; involucres campanulate, the lobes triangular subulate; glands transverse oblong, more or less cupped in the centre; appendages narrow. 3—4—crenate lobed or nearly entire; stigmas short, bifid. Capsules smooth; carpels carinate; seeds sharply quadrangular, slightly to manifestly rugose between the angles, the rugæ sometimes so obtuse as to make the surface appear shallow pitted.

Just as my collection contains many ascending *maculatas*, and prostrate *hypericifolias*, it has several ascending *serpyllifolias*, a sufficient number at least to render the prostration of this species a doubtful characteristic. As to the leaves, the denticulation of the apex though often slight, is always characteristic and constant, so also is the truncation, though the form of the blade may vary greatly. The presence or absence of angles upon the stem offer no guide to the determination. The involucral lobes however never vary, nor do the seeds once carefully examined, ever suggest any other species.

The species and its forms appear to range from southern British Columbia east to Lake Superior, thence southward through Wisconsin and Iowa to Texas and northern Mexico, including all the states and territories west of the 95° longitude. The individuals approaching nearest the type that I have examined, are as follows: From Bear Creek, Colorado, E. L. Greene, 1889; Santa Clara, California, B. F. Leeds, 1889; Flagstaff, Arizona, M. E. Jones (3998), 1884; and Santa Rosa, California, E. L. Greene, 1888.

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cation we have respecting the derivation of the type. Mexico then extended north to the forty-second parallel of latitude, including thus the present states and territories of Colorado, Utah, Nevada, California, Arizona, New Mexico, and Texas.

Ascending forms from lower Sacramento, Calif., Wilkes Expedition; Oregon, E. Hall; San Bernardino Valley, Calif., S. B. Parish: Ione, Amador Co., Calif., E. L. Greene; and others.

A specimen from central California collected by J. G. Lemmon is a fine transition form to *var. consanguinea*, with no red coloration; this is followed by a specimen collected by M. E. Jones at Flagstaff, Arizona, having leaves as markedly red-maculate as those of *E. maculata*.

Var. CONSANGUINEA (Engelm.), Boiss. (D. C. Prod. Pars. xv. 2. p. 43). Differs from the species in having a more erect growth; an obtuse sharply serrate apex to the leaves; lacerate lobes to the involucres; darker and more ovate seeds less sharp on the angles; and more or less red coloration in the stems and leaves. (*C. consanguinea, E. notata, E. subserrata, Engelm. (ined.)*; *E. inequilatera, Engelm.* Bot. Mex. Bound. Surv. p. 187). Over the same range as the species west of the Mississippi.

Under this must be included the North American specimens of *E. sanguinea, Hochst. et Steud.*, as the points of supposed difference so carefully considered by Prof. Greene, Bull. Calif. Acad. vol. ii. p. 57, are found to be far from constant.

Prostrate forms from northern Lower California, herb. Orcutt, and Owen River valley, herb. Columbia: ascending forms from Redding, Calif., collected by E. L. Greene on his journey of 1889; erect forms from Napa Valley, near the Soda Springs, Calif., E. L. Greene, 1882; Lake Pend d'Oreille, Idaho, E. L. Greene, 1889; Klickitat Co., Washington, collected by Suksdorf, 1883; and with very closely imbricated leaves from the Smoky Hills of Kansas, collected by J. E. Bodin, 1886.

Var. NEO-MEXICANA. Erect, glabrous, with acutely angled branches. Differs from the species and *var. consanguinea*, chiefly in its elongated sharply pointed seeds, having the two

ventral facets concave, and the involucral lobes entire or 2—3 cleft. (*E. Neo-Mexicana*, Greene, Bull. Calif. Acad. Sci., vol. ii. p. 55.

So far only known from New Mexico, where the type was found by Prof. Greene, on the plains of the upper Gila River in 1880; in an unknown location in that territory by Dr. Geo. Vasey (450), 1881; also in New Mexico location unknown to me, by Dr. Palmer, 1869, communicated to me over the label "*E. glyptosperma, Engelm.*"

Var. RUGULOSA, Engelm. (ined.) Differs principally in its thickly matted growth; the prolongation of the teeth down the longer side of the leaf; and the turgid very finely rugulose seeds. The type from San Bernardino, Calif., S. B. & W. F. Parish, 1881; specimens also from San Bernardino Valley, Calif., S. B. Parish, 1887; and lower Sacramento Valley, near Suisun, E. L. Greene, 1889.

The species most likely to be confounded with *serpyllifolia* in some of its forms are: the *pseudoserpyllifolia* and *Greenei* of the succeeding pages of this article. These neatly join the species to *E. glyptosperma, Engelm.*, which however is always easily distinguished by its seeds having several deep and regular transverse ridges that include the angles.

Explanation of Plate I.

1. Fragment of the original *Euphorbia serpyllifolia, Pers.*
2. Involucre and stipule of the same.
3. Under surface of appendage and lobe of involucre.
4. Leaf (average form in the type).

Various Specimens of the Species.

5. Seed of M. E. Jones' specimen (3998), Flagstaff, Arizona.
6. Leaf, stipule, and involucre of same.
7. Lower stipule of same.
8. From E. L. Greene's specimen from Santa Rosa, Calif.
9. From M. E. Jones' prostrate, maculate specimen, Flagstaff, Arizona.
10. From E. Hall's Oregon specimen.

Various Specimens of *var. consanguinea.*

11. Seed from E. L. Greene's Lake Pend d'Oreille, Idaho, specimen.
12. Leaf, stipule, and involucre of same.
13. From Suksdorf's Washington specimen.
14. From the Orcutt herb. specimen from Lower California.
15. From the Napa Soda Springs specimen described by Prof. Greene as *E. sanguinea, H. & S.*, in Bull. Calif. Acad. Sci., Vol. 2. p. 55.

E. Serpyllifolia, *var. Neo-Mexicana.*

16. Seed from the type specimen of *E. Neo-Mexicana, Greene.*
17. Leaf and stipule of same.
18. Glands, appendages, and involucral lobe of same.

E. Serpyllifolia, *var. rugulosa.*

19. Leaf, stipule, and involucre from the type.

(All enlarged.)

EUPHORBIA SERPYLLIFOLIA, AND ITS FORMS.

2. New or Noteworthy Species.

Euphorbia (§ *Anisophyllum*).

E. PILULIFERA, *var.* PROCUMBENS, Boiss. (D. C. Prod. Pars. xv. 2. p. 21). Collected by Dr. J. Riddell, at Key West, Fla., 1839; communicated to me for identification by Dr. Charles Mohr, from his herbarium. This extends to the United States the North American range of this plant.

E. FENDLERI, *var.* CHÆTOCALYX, Boiss. (D. C. Prod. Pars. xv. 2. p. 39). Specimens collected by Prof. Greene at Peach Springs, Arizona, during his journey of 1889, agree exactly with Torrey & Gray's *E. Fendleri* as represented in Dr. Torrey's herbarium by Thurber's No. 408; but differs greatly from his No. 407 which is on the same sheet. The specimens further agree with Boissier's description of *var. chætocalyx* which is drawn from Wright's No. 1847 collected in New Mexico. We must therefore judge that Thurber's 408 is not a type of the accepted species. Marcus E. Jones' No. 4217. collected at El Paso, Texas, in 1884. and distributed as the species, is a fine example of this variety.

E. PSEUDOSERPYLLIFOLIA. Prostrate or ascending, branches numerous, terete, glabrous; branchlets filiform, slightly hairy at their bifurcations; stipules elongated, triangular, hairy: leaves oblong, obtuse, entire, obliquely subcordate at the base, short petioled: inflorescence solitary in the upper axils: involucres campanulate, glabrous: lobes triangular, their margins thickly set with long cylindrical papillæ; glands red, orbicular, concave, raised upon a short thick stipe, appendages none: styles deeply cleft, stigmas capitate; capsules minute, carpels sharply keeled; seeds elongated, quadrangular, pointed, very slightly rugose between the angles: lavender color when ripe. Branches 5—12 cm. long; leaves 3—5 mm. in length; capsules $1\frac{1}{2}$—2 mm. From the valley of the Gila River, Arizona, P. F. Mohr, 1873, communicated

to me by Chas. Mohr over the label of "*E. serpyllifolia?*": also collected by Marcus E. Jones at Bowie, Arizona, 1884, and distributed as No. 4223, labeled "*E. serpyllifolia, var.?*".

E. GREENEI. Prostrate, stems several, glabrous, spreading from the rootstock like the spokes of a wheel, soon and often divaricately branching: branches terete, glabrous; branchlets often with a very few widely scattered hairs; internodes 1½—2 cm. long; stipules triangular at the base, lacerate: leaves ovate, entire, oblique at the base, mucronulate: inflorescence solitary in the axils, the peduncles twice the length of the petioles; involucres campanulate, glabrous without hairy within; lobes cylindrical, truncate, dilated at the base; glands rose-red, orbicular, folded upward upon themselves; appendages white, of the width of the folded gland, margin mostly entire, in some slightly crenulate; styles short, bifid, stigmas capitate: capsule smooth, carpels bluntly carinate; seeds ovate, sharply quadrangular, the facets irregularly transverse ridged, including slightly the angles. Stems about 1 cm. long; branches 10—12 cm.; leaves 4—6 cm. long: petioles 1 mm. The regular radiation of the branches and their almost equal length renders this plant one of the prettiest of the *anisophyllæ*. The seeds bring it very close to *E. glyptosperma, Engelm.* Beaver Canon, Idaho, E. L. Greene, journey of 1889.

[E. PONDII (to appear in coming vol. Proc. U. S. Nat. Mus.) ranks next in this section.]

E. LAREDANA. Prostrate, densely leafy, white, viscid, villous: stems numerous, frequently branching yet continuous: leaves lanate, short-petiolate, very obliquely cordate at the base, entire, obtuse; stipules indistinguishable on account of the densely lanate nodes; inflorescence solitary in the axils; involucres campanulate, sessile, minute, one snowy mass of white hairs; lobes triangular, hairy; glands 4, brownish green, transversely ovate, concave, exappendiculate;

ovary densely hairy; styles short, bifurcate; stigmas capitate; capsules glabrous near the base, the upper portion sparsely hairy; carpels sharply carinate; seeds pink, acutely quadrangular, the facets strongly marked by 4—6 irregular sharp transverse, white farinose ridges, which include the angles. Stems 6—12 cm. long; leaves 2—5 mm. long, 1—2½ broad. Near *E. setiloba, Engelm.* Collected by C. G. Pringle at Laredo, Texas, 1888, being his No. 2074.

E. GLYPTOSPERMA, *var.* TENERRIMA, Engelm. This infrequently reported form was collected at the Mogollon Mountains, Arizona, by Dr. E. A. Mearns, in 1887, as his No. 155.

E. OCCIDENTALIS, Drew (Bull. Torr. Club, xvi., 1889, p. 152). We are pleased to record a new finding of this species at Mt. St. Helena, Calif., by Prof. Greene, in September, 1888. The type station is in Hy-Am-Pum Valley, Humboldt Co., Calif.

E. JONESII. Annual, erect, villous; root filiform; stems terete; branches ascending, internodes longer than the leaves. Leaves narrowly lanceolate, acute, obliquely cordate at the base, sharply serrate on both margins: petioles very short; stipules deltoid, ciliate. Inflorescence solitary in the axils of the upper leaves, appearing glomerate on the ends of the young branchlets; involucres campanulate, raised upon a pedicel twice the length of the petioles; lobes similar to the stipules but smaller; glands 4, small, green, transversely ovate, concave; appendages white, entire. About thrice the width of the glands; styles long, bifurcated to the base. Capsules smooth, shallowly tri-sulcate; carpels strongly keeled. Seeds steel-gray, short, tumid, sharply quadrangular. The facets transversely marked by 2—3 blunt ridges, in some also by a longitudinal accessory ridge causing a shallow pitted appearance to obtain. Plant 26 cm. high, branches 7—17 cm. long; internodes average 2—7 cm.; leaves 3 cm. and shorter, 2—5 mm. wide. Closely related to *E. florida, Engelm.* Col-

lected at Bowie, Arizona, 1884, by Marcus E. Jones. Distributed under the No. 4247, and over the label "*E. dentata?*".

(§ *Poinsettia.*)

E. DENTATA, *var.* GRACILLIMA. Strictly erect ($1\frac{1}{2}$—3 dm. high); stem slender, simple (in one case branched in the middle, but by apparent abortion), very finely appressed-tomentose; internodes 3—4 ($4\frac{1}{2}$—11 cm. long). Lower leaves ovate, irregularly crenate-dentate ($1\frac{1}{2}$ cm. long, $\frac{3}{4}$ cm. wide), middle leaves ovate-lanceolate, acutely irregular dentate (2—3 cm. long, $\frac{1}{2}$—1 cm. broad), with scattered bristly hairs beneath; upper leaves similar but larger; petioles usually half the length of the blade. Seeds thickly and sharply tuberculate, including the sarcous caruncle. Collected at Bowie, Arizona, by Marcus E. Jones, 1884.

(§ TITHYMALUS.)

E. EXIGUA, Linn. Found growing spontaneously by B. F. Leeds, in his garden in Santa Clara, Calif., and supposed by him to have sprung from seeds mixed with a purchase of garden seeds from some eastern (U. S.) dealer.

CROTON.

C. SONORÆ, Torr. (Bot. Mex. Bound. Surv. 2. p. 194). Specimens collected by J. Reverchon, upon the rocky bluffs of the upper Llano, Texas (No. 1595); differing in no way from the description of the type. Collected by Schott, at Sierra de Najos. The discovery of this species in Texas is of special interest, as Müller places it among the "*Species dubiæ Americanæ*" in De Candolle's Prodromus. (See pars xv. p. 695).

Botanical Literature, Old and New.

V.

Florula Bostoniensis. A Collection of the Plants of Boston and its Vicinity, with their Generic and Specific Characters, Principal Synonyms, Descriptions, Places of Growth, Time of Flowering, and Occasional Remarks. By Jacob Bigelow, M. D., Professor in Harvard University. * * Second Edition. * * Boston, 1824.

Rather more than a century has passed since the beginning of botanical book-making in North America. Of various local and general floras the century has yielded perhaps some sixty editions, by about half as many authors. Two of those authors gave us thoroughly good books about plants --really excellent works of descriptive botany; and we have no more. Both of them are now old books. Bigelow's Florula Bostoniensis is one of them. Darlington's Flora Cestrica is the other. We have in America no other systematic treatises on plants which make any near approach to these in point of fulness and accuracy of description; no others which like these breathe odors of meadow and woodland and prove their authors to have been on terms of affectionate familiarity with the living subjects of description and comment.

Dr. Bigelow tells us in his Preface that when the writing of this Flora was first decided upon, he and his botanical friend and companion, Dr. Boott, betook themselves at once to the fields—began a succession of journeys for the special study of the vegetation of the region. These researches having been made, the first edition of the Florula Bostoniensis was published in 1814. Of the second and ten years later edition the author says: "Many of the former descriptions

have been enlarged or amended from re-examinations of living plants, and many have been written out anew. Although the work more immediately applies to Boston and its environs, yet I have inserted in this edition all such plants as I have formerly collected and described in any part of the New England states." This second clause reveals the author's own just—and no more than just—appreciation of the kind of work he has been doing. Descriptions drawn up from living plants are so far superior to the ordinary run of herbarium-made diagnoses, that he will publish as many of them as he has written, even though the plants do not belong to the region covered by his title-page. We are glad that he did this; for long experience has taught us that whenever we desire to know more of some eastern plant or tree than either the herbarium specimens show or the popular manuals tell, in the Florula Bostoniensis we may expect to find what we want; or, if the species be not therein described, we have one more hope, and so turn to the excellent Flora Cestrica. For the conveying of satisfactory intelligence about East American vegetation in general, there is more good in these two antiquated and half forgotten volumes than in the whole three dozen editions of dry and emasculate compilation which have occupied the field from the days of Amos Eaton and Mrs. Lincoln down to and including the year 1890.

But we like the Florula Bostoniensis not only on account of its high-grade superiority as a book of plant description. we prize it for what it tells of the character and accomplishments of its distinguished author; in whom one might have traced the evidences of careful literary training, and general scholarship, even though he had not, on the title-page, commended himself to our appreciation by the rather generalized title "Professor in Harvard University." He is certainly a master of that correct use of terms which is an accomplishment quite as indispensable to good botanical writing, as the ability—sometimes native with a man, sometimes acquired—to see what nature presents. We also realize, and not without some satisfaction, that while the man's school-training may

have rounded some natural angularities, it did not eliminate all traces of individuality. Even some roots of botanical prejudice here and there show active signs of life. Under the inoffensive name of an author's conservatism we may allude to some of these.

At a time when the best of men, not only in Europe but America, were assailing and dismembering and correcting the Linnæan genera, Dr. Bigelow holds fast by almost everything Linnæan. From his dignified place in "Harvard University" he looks down serenely and very composedly on all such men as Michaux (in whose elaborate new Flora he of course has not been taught to recognize the masterly hand of the great L. C. Richard), and the printer-youth, Nuttall, over in Philadelphia, potentially though not in actual attainments the equal of Richard, and at that time already author of the most influential and serviceable work which had yet been issued on North American botany. His very conservative attitude toward these who, although he could not so regard them, were really the new luminaries on his own horizon, he defends in his Preface; but in language which, though moderate and inoffensive, is that of an amateur rather than of an experienced botanical scholar:

"I have in general preferred to retain the older names of genera, especially such as were in the first edition of this work, introducing as subgenera the divisions of later botanists, together with some others to which future distributors will no doubt give names. It is vain to attempt keeping pace with the continually shifting nomenclature of plants; and it may justly be questioned whether the benefit which results from making generic distinctions more precise, is not more than counterbalanced by the load of synonyms which it brings with it, and the discouraging necessity which it imposes on students of the science, to unlearn continually what they have acquired."

This is little else but the old outcry which the pedagogue and the nurseryman have always been raising against mere instability in nomenclature as being about the worst of evils

in science; and it seems to imply that real and scientific distinctions of genera are unimportant. It is a kind of protest which one easily tolerates so long as it hails from the usual quarter; but it comes with bad grace from the professional botanist, who naturally represents, not the popular side whence arises the clamor against what is at worst only an inconvenience, but the side of scientific fact, and of literary justice and accuracy. He, the true botanist, the public instructor, the author of books, falls below the proper dignity of his station, if, taking part in noisy outcry, he declines from the cause of the original investigator, the scholar and the critic, to whose class he belongs if he is worthy of his place.

From the first citations I shall make in illustration of Dr. Bigelow's conservatism in nomenclature, it may appear that, while he was himself a good observer, he profited nothing by what his American compeers had, contemporaneously with him, been doing in the line of the original and the critical. He may have seemed to hold something very like a disdainful attitude toward such men as Walter, Muhlenberg and Nuttall, when he restored to the wild Touch-me-nots of his region the rejected name *Impatiens noli tangere*, after those authors had so clearly shown that we have no *I. noli tangere* in the United States, but two very distinct and new species in its stead. Six, at least, of Nuttall's newly proposed genera fall in his way, *Leptandra*, *Comandra*, *Epiphegus*, *Amphicarpa*, *Carya* and *Microstylis*; and it is amusing to observe that he rejects them all, save *Leptandra*—the only one of the six which subsequent authors have failed to approve and confirm. Nor do the rest of Dr. Bigelow's American colleagues receive higher compliment. *Caulophyllum* and *Anychia* and *Ampelopsis* of Michaux, *Chimaphila* of Pursh and *Acerates* of Elliott—all these have their species remanded to the old places which they hold in the works of Linnæus and of Willdenow.

And yet our author can hardly fall under suspicion of any particular superciliousness toward his fellow-laborers in New York, Pennsylvania or elsewhere on American soil; for he

pays not a whit more deference to the opinions of the great luminaries of botany across the sea. The new genera of Borckhausen, Mœnch, Robert Brown, De Candolle and Richard find no favor in his eyes. He gives them each a little nod of recognition "as subgenera," and that is all. But, small though his charity be for the propounders of new genera, Dr. Bigelow must needs have a new one of his own making in his Florula Bostoniensis. And what a genus! *Potentilla arguta*, Pursh, as "*Bootia sylvestris*," and the new name not spelled conformably to that of the botanist, Dr. Boott, who is complimented.

In the considerable number of new species proposed, our author was more fortunate; and his work will always be referred to as the bibliographical source of such admirable species as *Stellaria borealis*, *Actæa alba*, *Lactuca integrifolia*, *Myriophyllum tenellum* and *Juncus militaris*; as also for the first referring of *Lathyrus maritimus* to its proper genus.

But, viewed in its several aspects as a volume, it on the whole surpasses, as we said at first, every other book of descriptive botany which New England has yet given us. There is no appearance of cheapness about it. The paper is good and durable; the type respectably large and pleasingly and usefully varied. The scholar and the man of taste—not alone the close and hard economy of the book-seller—had a word to say about the execution of it. While the author's own opinion of generic and specific limitations are given, those of other men are not excluded; in other words, there is some synonymy. And while for the convenience of those who wish an easy way of determining species, the special characters of them are given apart from the more detailed description of the whole plant, the latter most important yet most expensive part of the business—expensive both as involving the heaviest tax on the time and energies of the author, as well as upon the finances of the publisher—is not omitted; so that on the whole, we have a book for amateurs and beginners, and at the same time one worthy of the botanist and the scholar. For three quarters of a century

now, this has remained, for New England, the only book of botany of its high stamp; and we wonder if the century will not complete itself before even Harvard University, with all its increased facilities for every kind of botanical work, will produce another equal to it.

Manual of the Botany of the Northern United States, * * * * By Asa Gray, late Fisher Professor of Natural History in Harvard University. *Sixth Edition. Revised and Extended Westward to the 100th Meridian*, By Sereno Watson, Curator of the Gray Herbarium. * * * * New York and Chicago, 1890.

A new thing has come to pass in the history of botany in this country. A new issue of Gray's Manual has met with much adverse criticism and little or no praise. Ten years ago no one would have dreamed of this as possible. During more than forty years this book in its various editions seems fully to have answered every recognized want of those supposed to be interested in the botany of the "Northern United States." Yet in no edition did the work sustain a higher character than that of a terse, abbreviated and condensed compilation. The author, long before its first issue, had ceased to study, either for his own enlightenment or for others' benefit, the flora of the vast region embraced, or any part of it. He had become engaged in the prosecution of other schemes. The book breathed no fresh odors of the woods and meadows. It was about as incapable of inspiring any interest, or begetting any spirit of investigation in those who used it, as it would have been had it been written from an herbarium in some foreign country. Nevertheless, as a good analytical key to the accepted classification and conventionally receivable nomenclature of the higher vegetation of the region, there was a demand for it. There had been both a demand for this inexpensive and elementary kind of

a Flora, and a supply to meet the demand, long before the year 1847 when the first edition came forth: witness the eight editions which Eaton's Manual had gone through between 1817 and 1840, not to speak of the similar treatises by Beck and by Alphonso Wood, whose Class Book, by the way, had reached its tenth edition in the year when Gray's Manual first appeared, and which still seems to hold a secure place in the book market alongside its rival.

The expressions of disappointment which this sixth edition of the Manual have elicited, do not imply any marked deterioration in the character of the book. In few respects is it better, in few worse than former editions. Neither have the botanists of the country become so unreasonable as to have expected now a volume for the learned, in the garb of the old school Manual and in the place of it. Such a Flora as botanists long before now ought to have had for the region embraced a book with thorough and full descriptions, good bibliography, and all on good paper, in neat and comfortable type—could not be brought out in one handy volume. It would make three. Everybody must acknowledge this. The dissatisfaction explains itself on this ground only, that we have now in the country a considerable number of people so well grounded in the principles of botanical work as to be aware of the many and serious defects of this book in all its editions, and to deplore them. It is not so much a local retrogression, as a general advancement that these things indicate. There has been a revival of interest of late in all matters appertaining to systematic botany. A long period of slow decline which, a few years ago had almost reached stagnation except at Harvard University, is ended. There was no more significant token of the general stagnation than that attitude of lowly and submissive admiration in which people received every word that was uttered from the botanical department of the institution above referred to. This servile posture, so long maintained has done injury to botany in our country, in more ways than one. It is an unscientific attitude to begin with; and it leads almost inevitably to

arbitrariness on the part of the individual or the community thus cringingly deferred to, investing them too with a false dignity, and tempting them to play fast and loose with principles —as Harvard botanists have certainly been doing for half a century past in matters of nomenclature in particular.

The first and most potent criticism of this new Manual which I have read implies —and rather more than implies— the recognition of a disdainful attitude assumed by Dr. Watson toward some of his fellow-laborers who are among his nearest neighbors. He is accused of having treated New York, New Jersey and Pennsylvania—parts of the country which were in need of that renewed and critical re-exploration which has of late years so zealously and so fruitfully been given by the Torrey Club and the Philadelphia Academy—as a "tabooed region," in the matter of geographical distribution. This possible animus of the book may seem to have come out again in connection with the nomenclature of genera. The editor's professed "reasonable regard * * to the claims of priority" may seem to amount to this, that he is willing to adopt an old—or the oldest—name in so many cases as in which the claims to priority have been set forth, and the species transferred, by some foreign author away in the past. It may have been upon this principle that *Nelumbo*, *Buda* and *Belamcanda* were allowed to supersede *Nelumbium*, *Lepigonum* and *Pardanthus*. The inference is plausible that *Tissa*, *Hicoria*, *Micrampeles*, etc., might have had "reasonable regard" shown them as prior, respectively, to *Buda*, *Carya* and *Echinocystis*, had their claims first been asserted, and their species re-named, somewhere else than at an American seat of present botanical activity and progress.

If such unhappy feeling is alive at Harvard, it is well that so much expression of it should involuntarily have found place in the volume; for once made manifest, its condemnation is assured.

The renewal, after so long and such well nigh universal a suppression, of so feeble a generic proposition as Elliott's *Strophostyles*, will be sure to call renewed attention to the

recent bibliography of those familiar species of Wild Beans. The nomenclature of them under *Phaseolus*, which was all wrong in former editions of the Manual, had lately been set right by an author in New York. Will not this new surprise of a *Strophostyles* movement be likely to get construed as additional evidence of Harvard's extreme aversion to being corrected from Columbia?

It is easily conceivable that this task of revising the old Manual may have been more or less unwelcome at a place where there was already too much other and more important business waiting to be done. Many errors in the text are such as will creep in where an editor, hard-pressed for time, is hastening to make an end of a wearisome piece of botanical drudgery. Only so may it have come to pass that of the two species of *Nelumbo* mentioned, one is put in the feminine, the other in the neuter gender; and that *Geranium columbinum* is left without an author, as if the authorship had been unknown. But the errors in nomenclature, citation and the like, are too many for us to recount them; besides, these are faults which the old editions have in common with the new; and even errors in the old, are in the new edition replaced, not by corrections but by other old errors. These will perhaps do little real harm; and, while the book will be useful—just as a mere reprint of the Fifth Edition would have been useful—to beginners, and especially those destined to make no more than the school-child's beginnings at botany, it will be telling to many old friends of the book and of the place which it comes from, the unwelcome news that Harvard University is declining from its former place at the head of the list of well-manned and learnedly conducted schools of botany in America. To other old friends, the criticisms, undeferential at least, when not unsparing, which greeted the Sixth Edition's first appearing, will have announced something like the collapse of an autocracy which, while doing much service in its own way, had, in some of its aspects, appeared to sit as an incubus on the botanical mind of the country at large for many years.

New or Noteworthy Species.

VIII.

Vancouveria parviflora. *V. hexandra*, Greene, Bull. Calif. Acad. i. 66, and mainly of Brew. & Wats. Bot. Calif. i. 15. A low evergreen undershrub with running lignescent rootstocks and short erect leafy branches rising an inch or two above ground: leaves subcoriaceous, purplish in age and persistent through the winter: scape less than a foot high, bearing a loose panicle of 25 to 50 small white or lavender-tinged flowers: ovary glabrous.

Common on bushy hills from the Santa Cruz Mountains northward to and beyond Mt. Tamalpais, California, flowering in May. Readily distinguished from *V. hexandra* by its three or four times as numerous small flowers and glabrous ovary, but most remarkably unlike it in its vegetative characters; for that has thin membranaceous leaves which die at the end of summer. Moreover, its stems rise singly, or only two or three from one root, whereas those of *V. parviflora* form crowded masses often several feet broad.

Vancouveria hexandra, var. chrysantha. *V. chrysantha*, Greene, Bull. Calif. Acad. l. c. This differs from the type in having almost golden-yellow flowers, those of true and original *V. hexandra* being white. It was owing to my having been erroneously taught that what I here name *V. parviflora* was the true *V. hexandra*, that I made the mistake of publishing the large yellow-flowered plant as a species. *V. hexandra* has been found in Trinity County by Messrs. Chesnut and Drew. It also exists in the State Survey collection, probably from Mendocino County or from Humboldt: but it does not appear to trespass on the territory of *V. parviflora*. In the

very poorest herbarium specimens the two species are easily distinguishable by the difference in texture and color of the leaves, as also by the number and size of the flowers; while no one who has seen the two alive, who knows their different modes of growth, and the different duration of their foliage, can possibly confound them.

CEANOTHUS VESTITUS. Near *C. cuneatus*, and like it in size and habit: leaves and branchlets ashy-tomentulose, the former opposite, coriaceous, subsessile, 4 to 6 lines long, round-obovate, obtuse or retuse, somewhat concave above, sharply spinulose-dentate all around: flowers white: capsule apparently small, the short salient appendages inserted at about the middle.

Borders of pine forests on the mountains near Tehachapi, Kern Co., Calif., 25 June, 1889; growing with *C. cuneatus*, the latter at that time with almost mature fruit, *C. vestitus* being only well past flowering.

SAXIFRAGA LEDIFOLIA. Near *S. Tolmiei*, but caudex much stouter, its branches very leafy and not prostrate: leaves spatulate-oblong, obtuse, entire, 6 or 8 lines long: peduncles borne at the ends of leafy shoots, stout, 3 or 4 inches high, bearing a rather close cyme of from 5 to 15 large flowers: calyx nearly free from the ovary, the almost distinct sepals erect: petals lanceolate, white: filaments dilated at summit: carpels large, united at base, purplish.

This plant has been collected abundantly on the higher mountains above Truckee, California, by Mr. Sonne, and by him distributed as *S. Tolmiei*, from which it is distinguishable at a glance by its much greater size and more numerous leaves and flowers, even if one overlook the very radical differences in its mode of growth and flowering. True *S. Tolmiei*, as I observed and collected it on Mt. Rainier, is a very slender prostrate undershrub, whose filiform scapes bearing only from 1 to 3 flowers, arise from the leaf-axils of

a preceding year's growth. In *S. lalifolia* they terminate the newly grown or growing shoots of the year.

PARNASSIA CALIFORNICA. *P. palustris*, var. *Californica*. Gray, in Brew. & Wats. Bot. Calif. i. 202. Leaves from ovate-oblong to oval, an inch or two long, tapering from the broad or rounded base to a long or short petiole: scape 1 or 2 feet high, its very small sessile leaf borne above the middle and not cordate-clasping: corolla 1 to $1\frac{1}{2}$ inches broad.

Northern California and southern Oregon. The large tapering plantain-like leaves, very small bract near the top of the scape, and the extremely large flowers compel me to regard this as entirely distinct from *P. palustris*, a plant whose leaves exhibit no tapering of the lamina to the petiole, and whose bract is always large and near the base of the scape. I have seen no Californian specimens of true *P. palustris*: and it belongs to regions well to the northward of the most northerly habitat of *P. Californica*. Specimens collected by Mr. Howell in 1889, in swamps near Waldo, Oregon, are larger than any of the Californian, with their characters still more pronounced; thus showing that the plant recedes from *P. palustris* in character as it approaches the region where that species grows.

SELINUM ERYNGIIFOLIUM. Stoutish, 18 inches high, stem and bladdery-dilated petioles glabrous, the leaves roughish-pubescent and the inflorescence white-tomentose: the bipinnate leaves contracted, the ovate acute leaflets $\frac{1}{3}$ inch long or less, somewhat pungently tipped and recurved: fruit unknown.

Collected near the Yosemite Valley, California, June, 1889, by Elmer Drew. Related to *S. capitellatum*, but smaller and with a peculiar almost thistle-like foliage.

SIUM HETEROPHYLLUM. Roots fusiform-thickened below the middle: stem stout, notably angular and flexuous, 3 feet high: lowest leaves with a simple lamina which is rather

broadly rhombic-lanceolate, serrate or laciniate-cleft and 2 to 10 inches long, supported on a stout fistulous petiole; the later radical 3-lobed or -divided and passing to the truly pinnate, which have but 2 pairs of broadly lanceolate acute serrate leaflets: the bracts of the involucre broadly lanceolate, tapering at both ends: fruit 1½ lines long, strongly ribbed.

Brackish marshes near Suisun, California, where it is associated with *Cicuta Bolanderi*. It is always aquatic, and as compared with *S. cicutæfolium* in which the lowest leaves are the most dissected, reverses the order of leaf development. Except at high tide the simple blade of these lowest leaves is always emersed: but is borne on a stout hollow jointed and more or less submersed petiole.

MENTZELIA AFFINIS. A stoutish annual, often 2 feet high, with white and shining glabrous stems, simple and leafy below, widely branching above: leaves lanceolate, deeply sinuate-pinnatifid: flowers scattered, ½ inch broad, yellow: calyx-lobes attenuate-subulate, ¼ inch long: capsule 1 inch long, almost linear, hispid with short stiff hairs which are strongly pustulate at base: seeds short-cubical, the angles grooved, the surface muriculate.

California, from the plains of the San Joaquin near Lathrop, southward to the foot-hills of San Bernardino County, where it has been collected and distributed by Mr. Parish as "*M. dispersa*": also at San Jacinto, San Diego County, Mrs. L. Gregory. A much larger plant than either of its allies *M. albicaulis* and *dispersa*, having the foliage of the former, and necessarily separated from the latter by its long aristiform calyx-lobes and shorter seeds.

BRICKELLIA RHOMBOIDEA. Shrubby throughout and irregularly branching, 3 to 5 feet high: leaves thin, rhomboid or deltoid, coarsely toothed or subentire: inflorescence scattered and cymose at the ends of the divergent and leafy branches, hispidulous-pubescent, but not in the least glandular: involucre 4 lines long: achenes puberulent.

Shores of the Gulf of California and adjacent islands, Palmer, 1887, numbers 322 and 323; distributed as a variety of *B. floribunda*, to which large coarse, almost wholly herbaceous, viscid species, with its extremely ample leafless terminal and naked panicle, this shrub bears no special resemblance.

DOWNINGIA MONTANA. Stem simple or with few branches, slender and weak, few-flowered: corolla apparently very ringent, the segments of the widely removed upper lip notably contracted above the broad base, and lanceolate, neither erect nor reflexed, but produced forwards and a little divergent above the broadly 3-lobed mostly white, but blue-tipped, lower lip, the throat marked with one or two spots of purple.

In the Sierra Nevada, on the shores of Lake Eleanor, Tuolumne Co., Calif., 28 June, 1889, Chesnut & Drew.

In a genus where almost all the specific characters—and they are of the most pronounced kind—reside in the configuration and markings of the very delicate corolla, I should not have attempted to describe a species as new from dried specimens had not the collector been eminently successful in his efforts to keep many corollas from undergoing shrinkage and distortion while in press. The present one is the first member of the genus which we have from the mountains, unless *D. bicornuta*, which is still unknown to me, be montane in the northern part of the State. All the others belong to that very different geographical region, the plains of the interior.

EUNANUS PULCHELLUS, Drew, in herb. Very dwarf, the simple or branching stem $\frac{1}{2}$ to $1\frac{1}{2}$ inches high, very slender, the whole plant sparingly villous and somewhat viscid: leaves spatulate, entire, $\frac{1}{4}$ to $\frac{3}{4}$ inch long: calyx urceolate, the green-foliaceous very unequal segments as long as the scarious 5-angled tube: corolla 1 inch long, with very slender long-exserted tube, funnelform throat and bilabiate limb, the 2-lobed purple upper lip as long as the 3-lobed golden-yellow

and purple-dotted lower one: the broadly ovate, little compressed gibbous and indehiscent capsule hard-coriaceous, many-seeded: seeds brownish, of elliptical outline but cyathiform! deeply favose-pitted.

In moist meadows near Lake Eleanor, California, 1890, Chesnut & Drew. An extremely beautiful species of the Œnoe section of the genus, combining the habit of *E. Douglasii* with the flower and fruit of *E. angustatus;* the corolla half purple and half yellow. The seeds of this section of *Eunanus* are little known. In this one they are strongly cancavo-convex, but elongated, and the honey-combed character of the testa is very beautiful under a good magnifier.

Amarantus carneus, Monœcious, glabrous, prostrate forming a mat 6 to 10 inches broad, the branches pinkish, the glomerules of flowers and lower face of leaves deep flesh-purple; plant leafy and floriferous throughout: leaves obovate-lanceolate, entire, setose-tipped, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, tapering to a short petiole; bracts ovate-acuminate and setose-tipped: utricle smooth: seed black and shining, $\frac{1}{3}$ line wide.

Beaver Canon, Idaho, 1 Aug., 1889, associated with the new *Euphorbia Greenei.* An attractive little herb on account of its rich flesh-purple color. It is a near ally, nevertheless, of the coarse and homely *A. blitoides.* And this last, I may here remark, is already in California, having been found by me at Niles, in 1888, and near Suisun, 1889; in both places growing along the railroad, and thus evincing its immigration from the interior territories where it is native.

Juncus uncialis. Annual, stoutish, barely an inch high. with only a few short subterete or somewhat ensiform radical leaves: scapes strictly 1-flowered: flowers all 3-merous: capsule little more than a line long, obtuse, apiculate, about equalled but not surpassed by oblong acutish segments of the perianth which are hyaline, with a strong green midrib:

seeds ovate, apiculate at each end, neither ribbed nor even regularly striate, but marked with transversely elongated quadrate reticulations.

Low moist places in fields near Suisun, California, May, 1890, associated with *Pilularia*, a terrestrial *Callitriche*, and near the habitat of *Howellia limosa*. Very unlike our other small annual rushes as to its perianth and seeds.

Sisyrinchium Elmeri. Scape 6 to 10 inches high, very slender, less than a line wide, bearing a single spathe : leaves only 2 or 3 inches long, narrow, thin and delicate, not firmly erect : bracts of the spathe slightly unequal, rather obtuse, as long as the pedicels : ovary obovate, glabrous : perianth $\frac{3}{4}$ inch broad, yellow with purple lines, the segments acute.

Lake Eleanor, in the Sierra Nevada, 28 June, 1889, Elmer Drew. Very unlike the stout glaucous *S. Californicum* of western California, a plant which keeps near the seashore and is not likely to occur in the mountains. Doubtless the yellow-flowered species attributed to Plumas County in the "Botany of California" will prove to be *S. Elmeri*. The true *S. Californicum*, without becoming discolored in drying, leaves its impress on the herbarium sheets in a very dark purple ; a property not possessed by the new species.

BOTANICAL
GARDEN

Remarks on the Genus Actæa.

While we are not generally credited with more than two species of Baneberry in America, and one of these is loosely regarded now as a mere variety of the Old World *Actæa spicata*, I have latterly grown confident that that species is not with us at all, and that we may perhaps be shown to have three or four of our own. The genus will furnish a fine subject of investigation to any botanist of experience who, having a shady garden-corner to spare, will procure seeds from as many quarters of the globe as possible, and study the plants for successive seasons in the living state. The caducous sepals, the more delicate and scarcely more persistent petals, the baccate nature of the fruit, the more or less tuberous roots—all these and some other circumstances render it next to impossible to preserve in the herbarium the characteristics of species.

1. A. ALBA, Mill. Dict. (1768); Raf. in Am. Monthly Magazine, ii. 266 (1818); Bigel. in Eat. Man. ed. 3. 155 (1822).—In Watson's Index the Fourth Edition of Eaton (1824) is cited for the original publication of this now familiar name. Dr. Bigelow himself appears to have been no better versed in the botanical literature of his own period; otherwise he would not have claimed *Actæa alba* as his own, at first four years, and again six years after it had been published by Rafinesque. But that all American authors down to the present, should have overlooked the fact that Philip Miller had given the plant specific rank, with just this name, is a little surprising.

The absolute character of this species is the enlargement of the pedicels after flowering, not the color of the berries; for these are sometimes pure white, sometimes red, in all our

species, as far as known. There is therefore no reason for assuming that the red-berried *A. alba* is "the result of crossing."[1] The petals also seem to be quite different in form from those of the next species, for they are described as slender, dilated above and truncate. Those of *A. rubra* are rhombic-spatulate and acute.

2. A. SPICATA, Linn. Sp. Pl. 503 (1753). This plant, probably confined to the Old World, is said to have a radical leaf and black berries. No known American species has either of these characteristics. I doubt whether the Japanese *Actæa* be identical with the European.

3. A. RUBRA, Willd. Enum. Hort. Berol. 561 (1809). *A. spicata*, var. *rubra*, Ait. Hort. Kew. ii. 221 (1789). Of this, the berries are cherry-red, and the lowest leaf is inserted high above ground, often about midway of the stem, the base of which has a sheath or two but no leaf. On these two characters the species must be admitted.

The *Actæa* of our Pacific coast, published by Nuttall as new under the name *A. arguta* does not appear to be very distinct from the Atlantic one, and may be called *A. rubra*, var. *arguta*. As in the eastern type, the berries, commonly of a beautiful red, are occasionally of a clear white. Nuttall described the petals as "oblong, obtuse";[2] but that does not apply to our Californian plant. In this they are just as in the eastern type; so that possibly Nuttall's, from very far to the northward of California, may be proven a species. In all the Pacific coast plants the raceme is larger than in the eastern, and frequently displays one or more short branches, or secondary clusters, below.

4. A. VIRIDIFLORA. While in all other known species of *Actæa* the stem is solitary, in this new one they form a

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[1] Gray, Man. 47.

[2] Torr. & Gray, Fl. i. 35.

cluster, as many as five or six proceeding from a single clump of roots. The base of the stem is enclosed within several sheath-like rudiments of leaves, the one or two leaves appearing above midway ; and, as compared with other members of the genus whose flowering is known to me, the leaves are less developed at time of flowering, and that is as late as June and even July, which is very late in northern Arizona. The raceme of greenish flowers is particularly narrow, elongated and dense. In fruit it is commonly five or six inches long ; and while all the pedicels are short, those at base of the raceme are scarcely longer than those which are uppermost. The petals are rather numerous, the blade varying from ovate to nearly lanceolate, usually acutish, the whole petal being but little shorter than the remarkably short greenish stamens.

The habitat of this *Actæa* is in open rocky places among the pine and spruce woods of Mt. San Francisco, Arizona. It was collected, barely in flower, by the writer, July 10, 1889, and some years before by Dr. H. H. Rusby, whose specimens were in immature fruit. The ripe berries are unknown.

Notes on Ranunculus.

On pages 59 and 60 preceding, my attempt to bring order out of the then existing confusion of some Arizona species was only half successful. I have since learned that I was still in error about the type of what Dr. Gray, on Mr. Lemmon's behalf, had published as *R. Arizonicus*. That is a plant of the Huachuca Mountains, far to the southward of Mt. San Francisco ; and I had never seen it, up to the time when the paragraphs I am now citing were written. True *R. Arizonicus* neither occurs in northern Arizona, nor has it ever been collected or distributed by me.

The nomenclature of page 60 of this volume should be corrected according to the following; and those in possession of duplicates of the specimens there commented on should alter the labels as I shall now indicate.

R. SUBSAGITTATUS, var. SUBAFFINIS. *R. Arizonicus*, var. *subaffinis*, Gray, Proc. Am. Acad. xxi. 370. *R. Arizonicus* Greene, p. 60 *supra*, not of Lemmon. I apprehend that this plant of the timber line on San Francisco Mountain may prove specifically distinct from that of the wet meadows far below; but I leave it, for the present, in the rank accorded it by Dr. Gray. My own comments on the characters of *R. Arizonicus* given by Dr. Gray are without the least pertinency, seeing that this is not at all the plant which he had in view.

R. AFFINIS, var. MICROPETALUS. *R. Arizonicus*, var. *subaffinis*, Greene, l. c., not of Gray. I am glad to have been convinced that it was not this plant, but the preceding, on which Dr. Gray based his variety *subaffinis*; for it differs from the Colorado and northern *R. affinis* only in its much more slender habit, minute flowers, and long cylindrical heads of achenes.

There is a widely dispersed and often collected far-western species which has long been wantin specific definition. I call it

R. ELLIPTICUS. *R. glaberrimus*, Gray. Am. Journ. Sci. 2d Ser. xxx. 241; Port. & Coult. Fl. Colo. 7; Coult. Man. 7; Brew. & Wats. Bot. Calif. i. 7 mainly; Gray, Proc. Am. Acad. xxi. 369 in part, not of Hooker. *R. brevicaulis*, Hook. Loud. Journ. vi. 66, not of Fl. Bor.-Am. (*teste* Gray, l. c.). *R. alismaefolius*, Gray, Am. Journ. l. c. 404, not of Geyer. Very glabrous: stems several, 2 or 3 inches high, from a large fascicle of perennial fleshy-fibrous roots: radical leaves elliptical, entire, acutish at both ends, the petiole equalling the blade; cauline narrower, often cleft into two or three

linear divisions: petals often wanting, sometimes 1 only, or 5, large, broadly obovate or more rounded, bright yellow: achenes very numerous, plump, smooth, tipped with a short curved style and disposed in a large globose head.

Lower and middle mountain districts of Colorado, Utah and Nevada to eastern California. Very nearly allied to *R. glaberrimus*, though a smaller plant, and inhabiting a different climatic belt. There is a difference in the achenes; those of the true *glaberrimus* having a slender beak. The order of leaf-division is, moreover, inverted in the two species. In *R. ellipticus* the cauline are 3-cleft while the radical are entire and even acute. In *R. glaberrimus* the radical ones are broad and broadly 3-lobed while the cauline are entire. The herbage of the latter invariably blackens in drying. In the former it undergoes no change of color.

Notes on Western Oaks.

Quercus Jacobi, R. Br. Campst; Greene, West Am. Oaks, 75. t. xxxv, xxvi. fig. 1. Within a few weeks after the issuing of the plates and description of this in the Illustrations of West American Oaks, I was privileged to visit Vancouver Island, where I saw and made notes upon the trees in front of the dwelling of the late Sir James Douglas, one of which is on record as being the type of Mr. Brown's species.

By reference to Mr. Brown's notes, reprinted by me, it will be seen that he credits both this and its ally, *Q. Garryana*, to the locality; in which opinion it is plain to me that he is in error. The two more than middle-sized trees on Sir James' lawn, one of which he calls *Q. Garryana*, the other *Q. Jacobi*, though differing in habit as he describes them, one being earlier, the other later in its flowering, are assuredly

one species, and that *Q. Jacobi*. The lesser tree of the two, with less umbrageous spread of branches, stands close by the north side of a high building which shuts off the sun so completely from all the ground around it, that the vernal development of leaves and flowers must thereby of necessity be considerably retarded.

Although I noticed many of these oaks in the neighborhood of Victoria, I saw nothing which I should call *Q. Garryana*.

The leaf-character of *Q. Jacobi* so faithfully brought out by Mr. Hansen in his drawing is pretty constant, and although a good mark of the species, there is even a better one in the living tree. I refer to the color of the trunks. *Q. Garryana* is everywhere remarkable for the very light color of its bark; and this mark holds as perfectly in those northern districts of the Columbia valley and northward, as it does in California. The *Q. Jacobi*, so far from sharing this characteristic of its ally, is even a shade or two darker than what is seen in the average oak of this group.

The species is perhaps equally common on the insular and on the mainland shores of Puget's Sound. The precise northern limit of *Q. Garryana* is still to be determined; but we may safely say that, if the two species here referred to shall be found growing side by side, in any part of Washington or of British Columbia, they will prove distinguishable at a glance by the different shades of bark on their trunks, as well as by the subpalmate venation of the foliage, and the narrower acorns of *Q. Jacobi*.

Q. PUNGENS, Liebm. Chenes de l'Amerique Tropicale, 22. t. xlv. fig. 1. It is a great satisfaction to have seen in the Torrey herbarium, a specimen of Charles Wright's Texan No. 664, which Liebmann took for his type of this species. Dr. Engelmann made much confusion of it. He once referred it, as a variety, to the widely different *Q. undulata*. Sometimes he called even the little Arizona Black Oak (*Q. Emoryi*) "*Q. pungens*, Liebm." When I discovered the prickly-leaved Arizona variety of *Q. chrysolepis*, on the mountains as

far east as Clifton, on the borders of New Mexico, he wrote that this would "doubtless be the true *Q. pungens*, Liebm." Mr. Orcutt of San Diego claims familiar acquaintance with two distinct oaks of the Lower Californian peninsula, both of which he says were named by Dr. Engelmann "*Q. pungens*." The real thing can not be expected from that locality; and the one of the two of which Mr. Orcutt has sent me specimens is my *Q. turbinella*.

Liebmann's type above alluded to is a Texan tree, and apparently an excellent species, belonging to a remote district which has seldom been visited by botanists, though admirable specimens of leafy and fruiting branches, have been collected and distributed since Charles Wright's time, chiefly by Mr. Pringle, I believe. It is allied to *Q. undulata*, but has larger, thinner leaves of a distinctly obovate general outline, and prominently lobed, the lobes being sharply pointed. To this Texan type Liebmann added a Californian specimen from Lobb, the subject of figure 2 of his engraving; and this is pretty certainly a very common state of *Q. chrysolepis* in which the leaves are strongly and pungently toothed. So then, that confusion which Dr. Engelmann carried to an almost incredible extreme was begun by the author of *Q. pungens* himself.

In the herbarium of Mr. Lemmon I have seen sterile twigs of a shrub from the summit of Mt. Graham in Arizona which makes a near approach to the real *Q. pungens* in its leaf characters. This is all I have in evidence of the occurrence of the species to the westward to Texas; and it is not thoroughly satisfactory evidence.

Q. TURBINELLA, Greene, West Am. Oaks, 37 and 59, t. xxvii. That slightly aberrant form of this species which occurs in such abundance in the region of the Grand Cañon in northwestern Arizona, is not at all referable to *Q. pungens*, although the last remark which I made concerning it in the West American Oaks was the expression of a misgiving lest it should so turn out. *Q. turbinella* is an excellent species

inhabiting the hills and mountains bordering a vast tract of desert country. Its nearest ally is the California Coast Range shrub, *Q. dumosa.*

Q. AGRIFOLIA, Nee, as received, is the species which embraces *Q. berberidifolia*, Liebm.; and this announcement will be a surprise to those who have so long been taught that *Q. berberidifolia* was the synonym of *Q. dumosa* or some other shrub of the white oak series. No one who is familiar with our common Californian tree will mistake Liebmann's beautiful Plate xlv for anything but *Q. agrifolia.* There are several local variations of the species more or less deserving of varietal name and definition, and this is perhaps one of them, but it can hardly be specifically anything else.

REPRINT OF FRASER'S CATALOGUE.

While by name and by citation Fraser's Catalogue is familiar to everyone at all versed in North American botanical bibliography, the document itself is one of the rarest. Although ostensibly written by the Messrs. Fraser, London nurserymen of the early part of this century, the real author was Thomas Nuttall who afterwards became one of the most eminent of botanists and zoologists. It was perhaps the very earliest of his botanical publications; and, although the title does not show his name, it was immediately claimed by him as his production. Perhaps no mere dealer's list of plants and shrubs ever contained so great a proportion of names of species new to science. Unhappily, very few of these new species thus indicated were described. Most of them were first described a year later by Pursh in his Flora Americæ Septentrionalis. And yet, there are several names over and

above those usually admitted as dating from the Catalogue, which might well be added to the list. *Yucca glauca*, Nutt., is doubtless adequately characterized, and should supersede *Y. angustifolia*, Pursh, which is of a year later. The same may be said of *Dalea emeandra*, Nutt. as anterior to the current *D. laxiflora*, Pursh.

Of the two generic names herein first printed *Thuraria* is of course a mere synonym of Willdenow's *Grindelia*. But *Sideranthus*, a neat philological turn upon *Aster*, to which they are allied, was the name for a genus which was then in need of it. And this will manifestly have to come to the front; not by virtue of its having been printed here, and credited with two species; for neither of the species is characterized. But when, a year later, Pursh described them as species of *Amellus*, they became recognizable. And immediately Rafinesque (Am. M. Mag. ii. 268) wrote and published them as types of a new genus "Sideranthus Fraser." And this name, as dating from Rafinesque, supersedes *Chrysopsis*, *Aplopappus*, and I think every other genus to which either of the plants has ever been referred.

The example of the Catalogue which I have copied from, is that now in the Library of the Philadelphia Academy of Natural Sciences. It is the copy which was sent by the Messrs. Fraser to Zaccheus Collins, to whom our beautiful far-western genus Collinsia was dedicated. It had passed through the hands of Nuttall, and had received one or two slight corrections from his pen. Moreover, he had written his name in ink, as the author of the Catalogue, as I have indicated by brackets in this reprint. I doubt not that many a botanist in America, and some in Europe, will welcome this reproduction of a paper long since become extremely rare.

A CATALOGUE

OF

NEW AND INTERESTING PLANTS,

Collected in UPPER LOUISIANA, and principally on the River MISSOURIE, North America,

[By T. Nuttall.]

FOR SALE AT

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1813.

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1 *ALLIUM reticulatum. ‡ M.
2 *—— stellatum. ‡ M.
3 *Allyssum petrœum. ‡ M.
4 *Amorpha canescens. ‡ St. Louis
5 *—— nana. † This is a very elegant dwarf shrub, with highly odorous purple flowers. Collected near the Mandan towns, 1600 miles up the Missourie. It is perfectly glabrous, dentures of the calyx all acuminate, and the legume one seeded. It appears intermediate between *A. fruticosa* and A. pubescens, from both of which it is evidently distinct.
6 *Astragalus crassicarpus. ‡ Fruit about the size and form of *A. physodes*, but thick and succulent. Collected above the River Platte.
7 *—— melanocarpus. ‡ M.
8 *—— gracilis. ‡ M.
9 *Artemisia cernua. ‡
10 *Aristida. M.
11 *Batscia fimbriata. ‡ M.
12 *Bumelia confertiflora. † St. Louis.
13 *Bartonia decapetala. M.
14 *—— pollypetala. Both species of this fine genus are hardy, and thrive best in the open ground. M.
15 Chloris mucronata. ‡ St. Louis.
16 —— curtipendula. ‡ St. Louis.
17 Cyperus. ‡ Fl. not seen. Hab. near New Orleans
18 *Cynoglossum glomeratum. ‡ M
19 Calymenia Nyctaginea. ‡ M.
20 *—— pilosa. ‡ M.

21 *—— angustifolia. ‡ M.

22 *Cactus viviparus. This species has much the appearance of *C. mamillaris*, but produces a red flower, like *C. Flagelliformis*, and a greenish edible fruit, about the size of a grape. Collected near the Mandan towns on the Missourie: lat. near 49°.

23 *—— ferox.

24 *—— fragilis. Both these grow with the above.

25 *Cheiranthus asperus. ‡ M.

26 *Cytisus rhombifolius. ‡ Fl. not seen.

27 Diodia virginica. ‡

28 *Dracocephalum cuspidatum. ‡ A verticillate species. M.

29 *Dalea aurea. ‡ M.

30 *—— enneandra. ‡ This is, perhaps, the largest species of the genus; the stem is tall and erect, sending out numerous slender waving branches towards its summit, terminated by racemes of white flowers, and silky calyces.

31 *Elœagnus argenteus. † M.

32 *Evolvulus sessiliflorus. ‡ M.

33 Echites puberula. † N. Orleans.

34 *Eriogonum flavum. ‡ Fl. bright yellow. Collected in the vicinity of the rocky mountains.

35 *Erysimum montanum. M.

36 *Ferula pubescens. ‡ M.

37 *Fritillaria Americana. ‡ M.

38 Gonobolus hirsutus. ‡ St. Louis

39 *Gaura coccinea. ‡ M.

40 *Hypericum sureulosum. ‡ Mississippi.

41 *Hyssopus anethiodorus. ‡ Both calyx and corolla blue. M.

42 *Jussieua angulata. ‡ Mississippi.

43 Linum perenne. *Americanum M.

44 *Lillium Andinum. ‡ This species has affinity to L. *Catesbæi*, but the stem is usually 3—5 flowered. Collected in the vicinity of the Rocky Mountains, or Northern Andes.

45 *Liquiritia lepidota. ‡ Met with from the source to the confluence of the Missourie; and is probably the *liquorice* mentioned by Sir Alexander M'Kenzie, as found on the coasts of the North Pacific Ocean.

46 Lathyrus myrtifolius. ‡

47 *Lactuca oblongifolia. ‡ Fl. blue. M.

48 Liatris graminifolia. ‡

49 —— paniculata ? ‡

50 *Mentzelia oligosperma. ‡ M.

51 *Malva coccinea. ‡ Flowers scarlet, produced in dense spikes. Met with from the river Platte to the Rocky Mountains.

52 Œnoplia volubilis. † Mississippi.

53 *Œnothera cespitosa. ‡ This species is more perfectly stemless than *Œ. acaulis* of Cavanilles, from which it is distinct. Flowers very large and white, with dilated obcordate petals.

54 *—— albicaulis. ‡ M.

55 *—— serrulata. ‡ M.

56 *—— macrocarpa. ‡ The fruit of this species readily distinguishes it from every other, being remarkably compressed, and furnished with four broad wings. Hab. near St. Louis.

57 *Orobus diffusus. ‡ M.

58 *Oxytropis acuminata. ‡‡

59 *Phalangium esculentum. Fl. blue. The root of this plant is eaten by the Savages of the Missourie and Columbia Rivers

60 Podalyria mollis ? ‡ St. Louis.

61 *Potentilla mollis. ‡ M.

62 *Pycnanthemum dichotomum. ‡‡

63 *Penstemon angustifolium. ‡ M.

64 *—— grandiflorum. ‡‡ Flower about the size and form of *Digitalis purpurea*, and spontaneously subject to great variation in color.

65 *—— cristatum. ‡‡ M.

66 *—— teretiflorum. ‡ M.

67 *—— erianthera. ‡‡ These five species were all collected a considerable distance up the Missourie. *P. grandiflorum* is nearly the commonest species in that country, and it was first met with near the confluence of the river Platte, from whence it continues to the Andes, frequently occurring in vast fields, together with the *scarlet mallow*, which form a brilliant object, visible at some miles distance.

68 Passiflora lutea. ‡

69 Petalostemon violaceum. ‡ From St. Louis.

70 —— candidum. ‡ Ditto.

71 *Psoralea macrorhiza. ‡ M.

72 *—— esculenta. ‡ The root of this plant is very generally eaten by the savages of the Missourie, and called by the Canadians *Pomme de prairie.*

73 *—— incana. ‡ M.

74 *Ribes longiflorum. † M.

75 *Rudbeckia columnifera. ‡ Spontaneous varieties of this plant sometimes occur with bright fulvous flowers, colored like *Tagetes patula:* the stem is simple, seldom producing more than three flowers, which are of an uncommon length, appearing like a column of flosculi, subtended by 5–8 neutral florets, and a simple calyx.

76 Rudbeckia purpurea. * serotina. ‡‡ Stem somewhat branching and hirsute, flowers brighter and more numerous.

77 Saccharum brevibarbe. ‡‡ Near the Ohio.

78 *Seseli lucidum. ‡ M.

79 *Stylosanthes racemosa. ‡ Fl. not seen.

80 **Sideranthus* integrifolius. ‡ M.

81 *—— pinnatifidus. Fl. of both these species yellow, and considerably like those of the genus *Aster*, but from which they are sufficiently distinct. M.

82 Sycios angulata.

83 *Troximon ciliatum. ‡ M.

84 *—— glaucum. ‡ M.

85 **Thuraria* herbacea. ‡ Fl. yellow, and the calyx resiniferous. A shrubby species of this genus, *Inula glutinosa*, of *Persoon*, is called in Mexico, the Insense Plant: collected on the Missourie, and stands the open ground.

86 Uniola latifolia. ‡ From the Mississippi.

87 *Virgilia grandiflora. ‡ This fine species differs essentially from *V. bicolor*, in being perennial, and producing a simple stem, terminated by one to three large flowers: its entire pappus also distinguishes it from V. fimbriata. Found only in the vicinity of the Andes.

88 *Vitis campestris. † Collected on the Missourie, above the river Platte, on the plains, where it becomes bushy, and produces excellent grapes: it has considerable affinity to *V. riparia* of Michaux.

89 *Yucca glauca. ‡ Leaves narrow, and filiferous; capsule dry, coriaceous, and large as that of *Y. gloriosa*.—Flower not seen.—Used in N. Mexico as a substitute for hemp. Collected 1600 miles up the Missourie, about lat. 49°.

* New Species.—† A Shrub.—‡ Perennial.—M. from the Missourie.

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Some Genera of Rafinesque.

American zoologists during the last twenty years have been finding so very much original matter in the line of systematic zoology in the various papers of Rafinesque, that they have created a demand more than equal to the supply in the book market, for everything which this sanguine, erratic yet highly gifted naturalist ever printed.

Botanists in our country, long behindhand in matters of bibliography and nomenclature, are feeling now the necessity of attending to these concerns; and we are beginning to ransack the neglected shelves of libraries and book stores, to see what we have and what we lack of Rafinesque's botanical papers. I should like to be assured that there is one botanical library in all America which has every volume and pamphlet and magazine article which he wrote in relation to our botany. In even the old editions of Gray's Manual a dozen phanerogamic genera are recognized as having Rafinesque for their author. To this number two more at least, *Steironema* and *Hexalectris*, are added in the recent edition; and I think that the number of fourteen will be almost doubled, when all the genera of that region which have this botanist for their real first author, shall have found their places, as they will find them, in some future Flora of the Eastern States.

Some of the following cases I have long had in mind. Others are in the nature of more recent bibliographical discoveries made by me last summer, while enjoying the library privileges of the Department of Agriculture at Washington. of the Philadelphia Academy, of Mr. Martindale's residence at Camden, and of Columbia College, New York.

LEPARGYRÆA.

Rafinesque, Am. Monthly Mag. ii. 176 (Jan. 1818): Journ. de Phys. 260 (1819). *Shepherdia*, Nutt. Gen. ii. 240 (late in 1818).

In the course of a vigorous and well pointed dissertation on Pursh's Flora—at the page of the American Monthly Magazine above cited—Rafinesque has this paragraph: "*Hippophae argentea* does not belong to that genus, having the flowers as in *Elæagnus* and the fruit as in *Hippophae;* it has been made a new genus, and called *Lepargyrea* by Rafinesque in Florula Missurica." We know that, at the time of his writing the paragraph, "Florula Missurica" had not been printed; for upon the same page of this magazine, under another subject, he refers to the work as "yet in manuscript." I do not know that the book—or paper—was ever published. This, however, is of no importance. It does not affect the case of *Lepargyrea* as prior to *Shepherdia;* for, in this very review he repeats his proposed new generic name, and its equivalent, quite unmistakably; so that, as making its appearance here, in the columns of a journal advertised as devoted in part to science, there can never arise any doubt of the adequacy of scientific publication; while the fact that as therein published it has about a year of priority over *Shepherdia*, is equally beyond question. Nuttall's "Genera," at least as complete—and *Shepherdia* comes in only near the end of the work—seems not to have been issued until about the end of 1818. It was in the January issue of the Monthly Magazine for the succeeding year, just a year after the publishing of *Lepargyrea*, that Rafinesque reviewed Nuttall's celebrated work. In this review, it may seem as if he had forgotten his own publishing of *Lepargyrea;* for he mentions *Shepherdia* as one of Nuttall's proposed new genera, only to write *Hippophae* as its equivalent; but before the end of that year he must have recalled to mind the fact that he had published it as a genus himself; for in the Journal de Physique in that

year, he reclaimed it in words which I may thus translate: "*Shepherdia*, Nutt., had been named by Rafinesque in the Monthly Magazine, 1817, *Lepargyraea*, a better, earlier and a distinctive name."

I do not discover that the founder of the genus assigned any specific names. These should be:

1. L. CANADENSIS. *Hippophae Canadensis*, Linn., Sp. Pl. 1024 (1753). *Shepherdia Canadensis*, Nutt. Gen. ii. 240 (1818).

2. L. ARGENTEA. *Elaagnus argentea*, Nutt. Fras. Cat. (1813). *Hippophae argentea*, Pursh, Fl. i. 113 (1814). *Shepherdia argentea*, Nutt. l. c. (1818).

3. L. ROTUNDIFOLIA. *Shepherdia rotundifolia*, Parry, Am. Naturalist, ix. 350 (1875).

IOXYLON.

Rafinesque, Am. Monthly Mag. ii. 118 (Dec. 1817); Fl. Ludov. 170 (1817). *Maclura*, Nutt. Gen. ii. 233 (Dec.? 1818). *Toxylon*, Raf. Journ. de Phys. 260 (1819), and "New Flora, No. 578" (1836).

Apparently the earliest mention made of the Osage Orange in any work of botany is that in the Preface to Pursh's Flora. The fruit was unknown to that author. He was consequently unable to indicate with certainty its affinities; so, while describing it as well as he could, and suggesting that it was perhaps related to the genus *Morinda*, he left it without any other name than those assigned it by the explorer Lewis, who had called it "Osage Apple," and "Arrowwood of the Missouris."

Within three years from the time of the completion of Pursh's Flora, Rafinesque gave, in the American Monthly Magazine, as interesting and about as perfect an account of this tree as has ever been published. The paper is headed

thus: "*Description of the* IOXYLON POMIFERUM, *a new genus of North American Tree.*" It is one of the most important of early chapters in American dendrology. The author before writing it seems to have availed himself of every opportunity for getting information concerning this novelty from the far Southwest. He cites Pursh's hints relating to it, and acknowledges his special indebtedness to Bradbury, to Nuttall and to McMahon for information. These credits being given, he offers in due form the generic character of IOXYLON, and assigns the specific name *pomiferum*. Then follows a full and interesting account of the history and uses of the tree, its fruit and its wood.

About a year after all this had been done, Nuttall proposed the name *Maclura* for the genus, making no allusion to the circumstance of Rafinesque's having already published it by a good name and a full description. To this omission, Rafinesque, in 1819, in the Journal de Physique, adverts in a sentence which runs thus: "TOXYLON, Raf. Monthly Magazine, 1817, was changed without cause into *Maclura* by Nuttall, in 1818."

It will be seen that our author gave two different names to his genus. He appears to have held that, while no man might supplant another's prior generic or specific name for a thing, one might recall, and offer later substitutes for, those of his own making. Others, both before Rafinesque and since his time, have held to such a view; though it is wholly indefensible, and none now contend for it. In some paragraph of his not now at hand for citation, Rafinesque has explained—and I conjecture that his mother-tongue was modern Greek—that *Ioxylon* means Arrow-wood, and *Toxylon*, Bow-wood. There was an early report that the Indians used the wood for making arrows, and a later one that they employed it for bows rather than arrows. But either of Rafinesque's generic names is good, though IOXYLON alone has priority over *Maclura*, and must therefore stand as the name of the genus, while *Toxylon* which Rafinesque preferred, must with its several specific names pass along with

Maclura into the synonymy of the tree. The following may be of service to those who may wish to trace for themselves the early bibliography.

Ioxylon pomiferum, Raf. Am. M. Mag. ii. 118, and Fl. Ludov. 170 (1817). *Maclura aurantiaca*, Nutt. Gen. ii. 233 (1818). *Toxylon aurantiacum*, Raf. Med. Fl. ii. 268 (1830). *Toxylon Maclura*, Raf. Aut. Bot. No. 1091 (1836).

BOLELIA.

Rafinesque, Atl. Journ. 120 (1832). *Clintonia*, Dougl. in Lindl. Bot. Reg. xv. t. 1241 (1829), not of Raf. (1817). *Gynampsis*, Raf. Herbarium Rafinesquianum, 48 (1833). *Wittia*, Kunth. Enum. v. 156 (1850). *Downingia*, Torr. Pac. R. Rep. iv. 116 (1857).

Lindley in publishing the *Clintonia* of Douglas, makes no reference to any earlier employment of that generic name. The *Clintonia* of Rafinesque had nevertheless been twelve years in print. But the leading American botanical authors of that time, Jacob Bigelow and Amos Eaton, had not given it their approval, and he may have been guiding himself by their opinion, or he may have been unaware that any genus of which this might be a homonym had been proposed. However, Rafinesque was not unprepared to meet the emergency. He was an ardent admirer of that eminent statesman, philanthropist and patron of science, De Witt Clinton, and was set for the defense of the beautiful liliaceous genus which he had dedicated to him. Having observed that a second *Clintonia* was in print, he immediately asserted the right of his own genus to that name, citing De Candolle's example for the observance of the law of priority, and also by implication reiterating his favorite notion that an author may publish generic names "pro tem.," as he expresses it, and alter or withdraw them at his will, or even that he may license some one else to suppress such provisionally published name.

Here is what he says of Douglas' *Clintonia*, in the Atlantic Journal :

"According to the practice of De Candolle, this *G.*[enus] *Clintonia* of Lindley must be named anew, and mine prevail as anterior by 12 years. I have called it protem in my notes *Bolelia*, an anagram of *Lobelia*, to which it is very akin ; but Lindley may frame a better name for it, if he likes, provided he adopts my *Clintonia* of 1817."

Fortunately for the synonymy of the genus, Lindley did not accept the invitation ; and again fortunately, Rafinesque's own later alternative for *Bolelia*, namely *Gynampsis*, is only a synonym, for we consider the former the more agreeable name.

The plants when in flower very closely resemble certain small Lobelias, and have been separated from that genus chiefly on account of the elongated and very slender capsules, which resemble pedicels and take the place of them, so that the really spicate inflorescence appears as if it were loosely racemose, or even in some species corymbose. But the embryonic structure is apparently quite different from that of *Lobelia*. I have been unable to detect cotyledons ; and the young plants exhibit at first a considerable succession of opposite and decussate leaves, this arrangement changing to the alternate only after the plants have reached a maturer stage of development.[1]

Each one of the species has its own peculiar floral structure ; but the corolla being of very delicate texture does not well exhibit its characters in the dried specimen. By somewhat radical differences in the configuration of this organ, the species fall into two natural groups.

* *Larger lip of corolla concave, undivided, 3-toothed or -lobed at apex.*

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[1] The plant on which Dr. Torrey founded the genus *Porterella*, and which was afterwards referred to *Laurentia*, agrees perfectly with *Bolelia* in all respects save that its capsules are not linear, but broad and truly pedicellate. It differs from *Laurentia* just as *Bolelia* from *Lobelia*, and ought to resume generic rank as *Porterella*, or else be included in *Bolelia*. I incline to the latter alternative.

1. B. PUSILLA. *Lobelia pusilla*, Pœppig, ex Cham. in Linnæa, viii. 217 (1833). *Clintonia pusilla*, Don. Gen. Syst. iii. 718 (1834); DC. Prodr. vii. 347; Gay, Fl. Chil. iv. 323. The South American representative of *Bolelia*, and near to the next species.

2. B. ELEGANS. *Clintonia elegans*, Dougl. in Lindl. Bot. Reg. t. 1241 (1829). *Gynampsis flexuosa*, Raf. Aut. Bot. 14 (1840). *Downingia elegans*, Gray Syn. Fl. ii. 8 (1878), partly. In the common plant of Oregon, Washington and Idaho, which must be the type of this species, as well as of the genus, the larger (apparently lower) lip of the corolla is deeply concave, the bottom of the concavity being at first white, but afterwards changing to the same blue as the rest of the organ. The segments of the other lip, narrow and at first nearly parallel, are ultimately laid one across the other. A hint of this characteristic will be noticed in even the original figure of the species in the Botanical Register. I do not think the plant has been found in California; and, from the character of the soil and climate where it abounds, I should not expect it to occur in even the extreme north of the State.

3. B. INSIGNIS. *Downingia elegans*, Gray, as to the Californian plant. *D. insignis*, Greene, Pitt. ii. 80 (1890). Confined to the plains of the interior of middle California, and common in herbaria under the name of "*Downingia elegans*." The species is remarkable for few and very large flowers.

* * *Larger lip plane, nearly or quite trefoil-shaped*, i. e., *parted into 3 broad lobes.*

4. B. PULCHELLA. *Clintonia pulchella*, Lindl. Bot. Reg. t. 1909 (1836). *Downingia pulchella*, Torr. Pac. R. Rep. iv. 116 (1857). Very common in middle California. The lip is not, as in all the following, quite like a trefoil in the depth and arrangement of its lobes: so the species is in a manner intermediate between the two groups.

5. B. MONTANA. *Downingia montana*, Greene, Pitt. ii. 104 (1890). The only montane species.

6. B. BICORNUTA. *Downingia bicornuta*, Gray, Syn. Fl. Supplem. 395 (1886). Plains of the upper Sacramento, about Chico, etc. The largest species; commonly a foot high; in floral structure nearest the next.

7. B. ORNATISSIMA. *Downingia ornatissima*, Greene, Pitt. ii. 80 (1890). A small species of the lower Sacramento; the form of the corolla very peculiar.

8. B. TRICOLOR. *Downingia tricolor*, Greene, Pitt. ii. 79 (1890). Lower Sacramento plains.

9. B. CONCOLOR. *Dourningia concolor*, Greene, Bull. Calif. Acad. ii. 153 (1886). Same habitat as numbers 7 and 8; the most showy species of the genus.

Mr. Howell of Oregon expresses the opinion that in his region there are two other species besides the well known *B. elegans*; and he is a most minute observer and faithful reporter in all matters relating to botany. But I have seen no specimens of his, nor has he supplied notes on the peculiarities of the plants mentioned. One of them may perchance be the long unidentified "*Dourningia corymbosa*" of Nuttall, concerning the merits of which I am unable to offer an opinion; not knowing the plant except from the author's insufficient description.

MICRAMPELIS.

Rafinesque, Med. Repos. N. Y. v. 352 and Journ. de Phys. ii. 167 (1808). *Heramcria*, Torr. & Gray, Rep. Pl. N. Y. 137 (1840). *Echinocystis*, Torr. & Gray, Fl. N. Am. i. 542 (1840).

Marah, Kell. Proc. Calif. Acad. i. 38 (1854). *Megarrhiza* (Torr.) Wats. Proc. Am. Acad. xi. 138 (1876).

Four different names for this genus, it will be seen by the above, were proposed between 1840 and 1876, by American authors. And we had to wait for our friends at the British Museum to show us, as one of them did in 1888,[1] that the genus had been indicated, and well named, by Rafinesque in the first decade of the century.

The genus is a rather extensive one, especially if *Echinopepon* be included; and that is the view taken by specialists who, as we suppose, are most competent to decide. It is also still being augmented by the coming in of new species almost annually from Mexico and South America. The following occur in North America north of Mexico.

1. M. LOBATA. *Sicyos lobata*, Michx. Fl. ii. 217 (1803). *Momordica echinata*, Muhl. in Willd. Sp. iv. 605 (1805). *Micrampelis echinata*, Raf. ll. cc. (1808). *Echinocystis lobata*, Torr. & Gray, ll. cc. (1840); Cogn. in DC. Monogr. Phaner. iii. 815. The eastern species and type of the genus, from which the western all differ in being perennial and having seeds only moderately compressed, their cotyledons hypogœous. Muhlenberg's name, *Momordica echinata*, was first printed in 1793,[2] but entirely without description; and before the appearance of Willdenow's volume, in which both the name and a good description are given, Michaux had characterized the species as *Sicyos lobata;* hence priority of publication lies with the name *lobata*, rather than *echinata*.

2. M. GILENSIS, Britt. Trans. N. Y. Acad. viii. 67 (1889). *Megarrhiza Gilensis*, Greene, Bull. Torr. Club. viii. 97 (1881). *Echinocystis Gilensis*, Greene, Bull. Calif. Acad. i. 189; Pitt. i. 3. Smaller as to stem leaves and fruit than the preceding; but sharing the more essential peculiarities of the Pacific

[1] Britten, Journ. Bot. xxvi. 261.

[2] Trans. Am. Philos. Soc. iii. 180.

coast species. Plentiful in the cañon of the upper Rio Gila in New Mexico; also in Arizona, but not in California.

3. M. GUADALUPENSIS. *Megarrhiza Guadalupensis*, Wats. Proc. Am. Acad. xi. 138 (1876). Islands of the coast of California, and southward on the Mexican island of Guadalupe.

4. M. MACROCARPA. *Echinocystis macrocarpa*, Greene, Bull. Calif. Acad. i. 188 (1885). In the southern counties of California only; Santa Barbara, San Diego, San Bernardino, etc.

5. M. FABACEA. *Echinocystis fabacea*, Naud. Ann. Sci. Nat. xii. 154 (1859). *Megarrhiza Californica* (Torr.), Wats. Proc. Am. Acad. xi. 138 (1876). Middle California, both on the coast and in the interior. The name *Megarrhiza Californica* was printed in a Pacific Railroad Report (vol. vi. p. 74) as early as 1857, but without any clue to the identity of the plant: so the earliest specific name available is that given by M. Naudin.

6. M. MARAH. *Marah muricata*, Kell. Proc. Calif. Acad. i. 38 (1854). *Megarrhiza Marah*, Wats. Proc. Am. Acad. l. c. The name *Micrampelis muricata* must needs designate a Brazilian species (*Momordica muricata* of Vellozo) published in 1825.

7. M. OREGONA. *Sicyos Oregonus*, Torr. & Gray Fl. i. 542 (1840). *Megarrhiza Oregona*, Wats. Proc. Am. Acad. l. c. Oregon and Washington.

8. M. WATSONI. *Echinocystis muricata*, Kell. Proc. Calif. Acad. i. 57 (1854). *Megarrhiza muricata*, Wats. l. c. (1876). *Echinocystis Watsoni*, Cogn. DC. Monogr. Phaner. iii. 819 (1881). A somewhat rare species of the foothills on both sides of the Sacramento valley in middle California.

PTILORIA.

Rafinesque, Atl. Journ. 145 (1832). *Stephanomeria*, Nutt. Trans. Am. Phil. Soc. vii. 427 (1841).

1. P. PAUCIFLORA, Raf. l. c. (1832). *Prenanthes ? pauciflora*, Torr. Ann. Lyc. N. Y. ii. 210 (1828). *Stephanomeria runcinata*, Nutt. l. c. (1841), in part ? From Nebraska to Texas, and westward to the Rocky Mountains, and perhaps beyond them, into Utah, Nevada, etc. Named *Prenanthes runcinata* by Dr. James in 1825, but without description; and Nuttall's employment of this specific name appears to have been made without any reference to Dr. James' use of it, and his plant may be different, obtained as it was from a point to the westward of the Rocky Mountains.

2. P. TENUIFOLIA, Raf. l. c. (1832). *Prenanthes ? tenuifolia*, Torr. l. c. (1828). *Lygodesmia minor*, Hook. Fl. Bor.-Am. i. 205. t. 103 A (1833). *Stephanomeria minor*, Nutt. Trans. Am. Phil. Soc. vii. 427 (1841). A species of our northern borders only, as I judge; well marked in habit, the herbaceous stems being slender, reedy and flexible, usually bearing but few heads, and well clothed with long slender almost grassy leaves. None of the more southerly plants commonly referred to it share these peculiarities.

3. P. MYRIOCLADA. *Stephanomeria myrioclada*, Eaton, Bot. King Exp. 198. t. 20. Desert regions of the interior of Nevada.

4. P. WRIGHTII. *Stephanomeria Wrightii*, Gray, Proc. Am. Acad. xix. 62 (1883). Western Texas; perhaps extending to New Mexico and Arizona.

5. P. VIRGATA. *Stephanomeria virgata*, Benth. Bot. Sulph. 32 (1844). The herbage of this common species of the Cali-

fornian seaboard is deep green and entirely glabrous; but the leaves, dying away in summer before the flowering begins, are wanting in herbarium specimens, and so the following has long been confused with it.

6. P. CANESCENS. Tall and stout, but parted above into slender paniculate branches, the stem and leaves tomentulose: heads few and scattered, about twice as large as in the last; achenes larger, less tuberculate, pappus longer and of fewer bristles.

This replaces *P. virgata* in the interior of middle California, where it is very common. But it also occurs at Alameda, on San Francisco Bay; and in Napa Valley, where it was collected by the writer in 1874, and at that time referred by Dr. Gray to "*S. paniculata*" rather than to *virgata*. The pubescence, and the sparse, not virgately disposed heads at once distinguish it.

7. P. TOMENTOSA. *Stephanomeria tomentosa*, Greene, Bull. Calif. Acad. ii. 152 (1886). Here again the inflorescence is even more strictly and densely virgate than in *P. virgata*, and the achenes and pappus are as in that species; but the herbage is white-tomentose. Habitat, Santa Cruz Island, where it has been found only by the writer.

8. P. PLEUROCARPA. Tall and stout, virgate-paniculate, glabrous and glaucous: heads small. few-flowered: achenes very light-colored (buff rather than brown), fusiform, rugose-tuberculate between the salient rib-like angles; pappus-bristles numerous, distinct, plumose to the base, bright white, very soft, deciduous.

The only specimen known to me is of my own collecting, near Redding, Shasta Co., Calif., Sept. 1889; but the species may be common enough in those northerly foothills. I mistook it for *P. virgata*; but the character of the achenes is very peculiar. In the related species, the angles are elevated between as many deep and usually closed grooves.

In this the grooves are wanting, and the prominent rib-like elevations take just their places, the intervening parts being plane or somewhat rugose, not angularly raised. The promptly and completely deciduous pappus is another peculiarity.

9. P. PANICULATA. *Stephanomeria paniculata*, Nutt. Trans. Am. Phil. Soc. vii. 428 (1841). Plains of the interior, in Idaho, eastern Oregon, etc. And a plant so named by Dr. Gray was collected by myself in extreme northern California in 1876 (No. 963). But this, though otherwise agreeing perfectly with Nuttall's description, has scabro-puberulent achenes; and specimens matching that in every respect, save that the branches of the panicle are more virgate, were collected on Santa Cruz Island. These last are called, but erroneously, "*S. virgata*" in my list of the vegetation of the island.

10. P. CORONARIA. *Stephanomeria coronaria*, Greene, Bull. Calif. Acad. i. 194 (1885). Santa Lucia Mountains, Calif. Also sent from Monterey Co. by Mr. Hickman. Upon my description of this, Dr. Gray remarked: "by the character seems too near *S. exigua*."[1] But that species has pappus-bristles plumose only above the middle, while in *coronaria* the plume continues down to the top of the short paleaceous dilatation, at which point the plumose part breaks, and falls away, leaving a permanent short crown upon the achene. Nothing at all like this is seen in *P. exigua*.

11. P. EXIGUA. *Stephanomeria exigua*, Nutt. Trans. Am. Phil. Soc. l. c. Common in the vast half-desert territories of the Great Interior Basin. Perhaps in southeastern California; but all the Californian specimens look different, and may belong to *P. coronaria* or be of a species awaiting recognition.

[1] Syn. Fl. Supplem. 454.

12. P. PENTACHÆTA. *Stephanomeria pentachæta*, Eaton, Bot. King Exp. 199. t. 20 (1870). Western Nevada; also in northern Arizona and New Mexico by the writer. Very near the last; quite like it, indeed, in all points excepting the reduced number of bristles to the pappus.

13. P. SCHOTTII. *Hemiptilium Schottii*, Gray, Bot. Mex. Bound. 105 (1859). On the Gila River, southern Arizona; only once collected and that many years ago; the pappus paleaceous rather than plumose-bristly, palea sparsely plumose at summit.

14. P. THURBERI. *Stephanomeria Thurberi*, Gray, Mem. Am. Acad. v. 325 (1854). New Mexico and Arizona

15. P. LACTUCINA. *Stephanomeria lactucina*, Gray, Proc. Am. Acad. vi. 552 (1865). A low leafy species of the Sierra Nevada at middle or high altitudes; the heads few and the whole aspect of the plant that of a small *Lactuca*.

16. P. CICHORIACEA. *Stephanomeria cichoriacea*, Gray, l.c. Southern California, in the Coast Ranges chiefly; most abundant on some of the outlying islands. A stout, coarse, usually tufted plant, having little in common with the types of the desert regions, except the technical character of a plumose pappus.

ENUMERATION OF THE NORTH AMERICAN LOTI.

None but American botanists have altogether excluded the genus *Lotus* from the American flora. Those celebrated authorities in Europe who have admitted a kindred genus, *Hosackia*, as embracing a part of our species, have always

held that a certain group of what Americans called *Hosackia*, are not of that genus, but true *Loti*; and even that best type of everything which we have been calling *Hosackia*, namely "*H. bicolor*," was first published, by Sir W. J. Hooker, as a *Lotus*.

The chief authority by virtue of whose opinion the genus *Hosackia*, first suggested by the collector Douglas, obtained recognition and continuance, was Mr. Bentham. On what grounds the opinion was based we shall notice presently. But American authority, receiving *Hosackia* as a genus, did not follow Mr. Bentham's judgment of its proper limits, but placed all which he had called American *Lotus* also under *Hosackia*. To any one knowing these plants as well as Dr. Gray knew them—and they are to-day much better known than he knew them—there is but one alternative course to pursue, and this is to remand the whole series of species to the genus *Lotus*. Genera are not to be limited by geographical considerations alone; but "*Hosackia*" as now known is not otherwise distinguished from *Lotus* than as being American.

The American species, now numerous, are of four natural groups. *Lotus sericeus* of Pursh is the type of the first of these. It differs, as a group, from the Old World Loti in general by having its stipules reduced to small blackish gland-like organs. This is Rafinesque's genus *Acmispon*; and Nuttall had it in manuscript as a genus to be called *Psychopsis*. Mr. Bentham, on first defining *Hosackia* transferred this *Lotus* to it; but afterwards he restored it to the old genus in which Pursh had placed it at the beginning of its history.

With *L. subpinnatus*, Lagasca, and its North American allies, *L. Wrangelianus* F. & M. and *Hosackia brachycarpa*, Benth. begins a series of species which have a dilated leaf-rachis upon which the leaflets are somewhat unilaterally distributed, that is to say, they range themselves one or two on one margin, two or three on the opposite, so that counting all—the terminal with the rest, there is an even number of

leaflets (4 or 6) to the leaf as a whole. And this group, however extensive in America, is represented in Europe by the old *L. tetraphyllus*, Linn. The three American species above named have the narrow calyx-tube and the consequently approximated petal-claws, as well as the somewhat rostrate-attenuate keel of the most typical Loti; but their inflorescence is different. Their flowers are solitary and very shortly pedicelled, the pedicel without a bract. However, one species of the group, and that only lately recognized, begins its flowering by solitary short-stalked flowers, and ends by producing two peduncles from some axils, one of these being long and bracted as in the *strigosa* series. The short-pedicelled one-flowered subgroup, in so far as the species belonging to it were known, made up the *Lotus* section *Microlotus* of Bentham, and was proposed as a distinct genus *Anisolotus* by Bernhardi. But the transitions from these to the subgroup represented in Nuttall's *H. strigosa*, are as gradual as it is possible to imagine. So that the Microlotus section, which all great masters in Europe have held inseparable from *Lotus*, is equally confluent with what they have regarded as *Hosackia*. And the long series of species which here begins with *L. Wrangelianus* and ends *L. macranthus* form a natural group, distinguished from the first by dilated rachis and the few inequilaterally distributed leaflets, and from the typical Hosackia by this mark and the dot-like glands in place of stipules; though *L. Guadalupensis* is exceptional here, as having numerous leaflets equally distributed on both sides of the scarcely dilated rachis. Only its gland-like rudiments of stipules exclude it from the third group.

It was on members of the third group that *Hosackia* was first set apart as a genus. Herein reappear the manifest and more or less foliaceous stipules of genuine *Lotus*; but along with this mark is associated a new leaf-character. Old World Lotus is trifoliolate. Typical *Hosackia* has leaves made up of two or three, or even a greater number, of pairs of leaflets. This did not prevent the elder Hooker from publishing the

typical species as a *Lotus;* but it was just this character upon which Mr. Bentham placed most reliance when essaying to establish *Hosackia* as a genus.[1] At a later date he abandoned that as a feeble character, believing that he had found better marks of a genus in the structure of the corolla. He then claimed that *Hosackia* might be known by the space intervening between the claw of the banner and those of the other petals, by the partial coherence of the wings with the keel, and their spreading away from it.[2] He appears still later to have become aware that not more than two or three out of the twenty-five species of *Hosackia* he had seen, displayed the adnate and spreading wings; and so he eventually left the genus as distinguishable from *Lotus* by nothing but the remoteness of the claw of the banner from those of the wings and keel.[3] There is not a group except our first, in which this character does not fail utterly in a greater or less number of the species. Some authors in Europe have contended for a genus *Dorycnium*, based on Linnæan species of *Lotus*, on account of such a difference in the insertion of the petals, together with a difference in the shape of the keel at its apex. Whether *Dorycnium*, resting on such characters, can be other than an artificial genus may be left to the judgment of European botanists. It is clear to us who know them that our American Loti can never be separated into natural sections on such grounds.

The typical species of our fourth group are rather numerous, and bear one mark not found in any of the others, namely, an articulation of the pedicel with the common petiole, by which joint the mature pod, usually short, few-seeded and indehiscent, falls to the ground, calyx and all, when ripe. This character was discovered and first announced by the present writer.[4] But he had not then duly considered

[1] Bot. Reg. xv. under t. 1257.

[2] Trans. Linn. Soc. xvii. 363.

[3] Genera Plantarum. i. 490.

[4] Bull. Calif. Acad. ii. 145.

what is the general significance of this kind of character in that tribe of Leguminosæ, the Trifolieæ, to which these plants belong. As the West American clover-species with from five to nine leaflets are not to be separated generically from the rest, it follows that the pluripinnate-leaved American Loti must not be sundered from the trifoliolate type. And since the jointed pedicels and deciduous fruiting calyces of for example the Lagopus subgenus of *Trifolium* are not to be of generic import, neither may they be so treated in this group of *Lotus* which has been called a genus under the name *Syrmatium*. The indehiscence of the pods is not at all confined to this group of species. In the very type of the Hosackias and in all its near allies, the dehiscence is so tardy that they may about as well be described as indehiscent; and this appears to hold true of a fair proportion of species in Old World *Lotus*.

The conclusion here reached, after deliberate and prolonged investigations in field and herbarium is, that the more or less widely received genera, Lotus, *Tetragonolobus*, *Lotea*, *Krokeria* and *Dorycnium* of the Old World, along with *Acmispon*, *Anisolotus*, *Hosackia* and *Syrmatium* of the New are even more naturally of one genus than are the various subdivisions of the one genus *Trifolium* as now everywhere received.

* *Annuals with gland-like traces of stipules, leaves pinnately 3-foliolate (often 1, rarely 5 leaflets), flowers of typical Lotus, pod straight, readily dehiscent.*

—Genus ACMISPON, Raf.

1. L. SERICEUS, Pursh, Fl. ii. 489 (1814): Benth. Trans. Linn. Soc. xvii. 368. *Trigonella Americana*, Nutt. Gen. ii. 120 (1818). *Lotus Americanus*, Bischof, Del. Sem. Heidelb. (1839). *Acmispon sericeum*, Raf. New Fl. i. 53 (1836). *Hosackia Purshiana*, Benth. Bot. Reg. xv. under t. 1257 (1829). *H. elata*, *floribunda*, *pilosa* and *mollis*, Nutt. Torr. & Gray Fl. i. 327 (1838). The type of this perhaps

complex species is of the upper Missouri and regions adjacent, eastward of the Rocky Mountains. On the Pacific slope it appears under a great variety of aspects; either small, erect, very villous, growing on dry hills and perishing with most annuals early in the dry season of the year; or nearly glabrous, diffuse, with branches several feet long, along river banks in the hot interior of California where it lives and flowers from April until December; or again, at higher altitudes, in the open pine woods of the Sierra, it appears as a small, minute-flowered herb, as short lived as the summer months in that particular region. The species may be as numerous as Nuttall thought them, or they may be mere local variations of one. But the Atlantic coast plant usually referred here, has lately been proposed as distinct, and apparently on quite sufficient grounds. That is,

2. L. Helleri, Britton, ined. This is a slender, erect and wiry, very glabrous plant, readily distinguished by its very narrow and acute leaves. The pods are thinner and somewhat constricted between the seeds; these smaller and relatively shorter than in any forms of the so-called *L. sericeus*.

* * *Stipules gland-like; leaflets 4 to 10, unequally distributed on the opposite margins of a dilated rachis; pods readily dehiscent.*—Genus Anisolotus, Bernh.

+ *Annuals; flowers solitary, short-pedicelled, not bracted; claws of petals approximate and keel pointed.*

3. L. Wrangelianus, Fisch. & Mey. Ind. Sem. Hort. Petrop. 16 (1835); Linnæa, Lit.-Ber. 110 (1837). *Hosackia subpinnata*, Torr. & Gray, Fl. i. 326 and 692, not *Lotus subpinnatus*, Lag.—Common throughout middle California, from the plains of the interior to the seaboard; long regarded as identical with the Chilian *L. subpinnatus*, which is a smaller plant with narrower leaflets, relatively longer calyx-teeth and petals all narrower with shorter claws, the banner not erect, obovate-oblong merely, while in ours it is broadly obcordate.

4. L. HUMISTRATUS. *Hosackia brachycarpa*, Benth. Pl. Hartw. 306 (1849). *Lotus brachycarpus*, Wats. Index, 225 (1878), not of Hochst. (1842).—Middle and southern California and in southern Arizona; near the preceding and sometimes confounded with it, but readily distinguished by its prostrate habit, soft pubescence, subsessile flowers, calyx-teeth much longer than the tube, and very short 2- or 3-seeded pod.

5. L. DENTICULATUS. *Hosackia denticulata*, Drew, Bull. Torr. Club. xvi. 151 (1889). Erect, 1 to 2½ feet high, branching somewhat fastigiately, pale green and glaucous, sparingly pilose: calyx-teeth longer than the tube, denticulate; corolla only 2 lines long, pale yellow or salmon-color, changing to a rich dark red: pod pubescent, very short, 3-seeded.—An excellent species, long confounded with *L. Wrangelianus*. It combines the characteristics of two groups of species, the preceding, in which the flowers are solitary, short-peduncled and bractless, and the following, in which they are several, in a bracted umbel, at the end of a long peduncle; for most of the upper axils of *L. denticulatus* may be observed to yield two peduncles. one of which is very short and 1-flowered, the other greatly elongated, bracted and often 2-flowered. The species is common from Butte and Humboldt counties in California, northward to Vancouver Island. It embraces all the "*Hosackia subpinnata*" of Mr. Macoun's Catalogue.

+ + Flowers 1 or several, the elongated peduncle mostly bracted; claw of banner commonly remote from the others, keel mostly obtuse.

++ Annuals.

6. L. MICRANTHUS, Benth. Trans. Linn. Soc. xvii. 367 (1837). *Hosackia parviflora*, Benth. Bot. Reg. l. c. (1829). *H. microphylla*, Nutt., Torr. & Gray Fl. i. 326 (1838). A

slender glabrous glaucous species, the minute and pale flowers (1 or 2) at the end of a filiform peduncle. The pods, manifestly constricted between the seeds, are less promptly dehiscent than in any other of our annual species. Common throughout western California and reaches the British boundary. Nuttall's type of *Hosackia microphylla* in the Torrey herbarium is of this species plainly enough. I know not upon what ground others have referred it to *H. strigosa*.

7. L. SALSUGINOSUS. *Hosackia maritima*, Nutt., in Torr. & Gray Fl. i. 326 (1838). Ascending or depressed, sparsely strigose, somewhat succulent. the branches 8 to 18 inches long: peduncles an inch long, 1- to 3-flowered, naked or with a conspicuous 1- to 3-foliolate bract: corolla yellow, 3 lines long, banner and wings fully equalling the straight keel: pod little compressed: seeds obliquely oval, compressed, smooth. Common from Monterey southward throughout California. chiefly in clayey soils toward the sea, but also on subsaline flats of the interior.

8. L. HUMILIS. *Hosackia maritima*, Greene, Pitt. i. 288, not of Nuttall. Habit and texture of the last, but every way smaller, the branches apparently prostrate: leaflets 4 or 5, obovate, obtuse: peduncles shorter than the leaves, 1- to 3-flowered. naked or bracted: corolla 2 lines long, reddish, the banner and wings notably shorter than the broad obtuse abruptly inflexed keel: pod nearly terete, less than an inch long, 6- to 8-seeded: seeds very small, almost spherical, smooth. This well marked species is of the Lower Californian Peninsula; San Bartolomē Bay, Lieut. Pond.

9. L. TOMENTELLUS. Prostrate, much branched, canescently tomentulose: leaflets 5 or 7, cuneate-obovate or -oblong, obtuse: peduncles slender, shorter than the leaves, the lowest bractless and 1-flowered, the later often bracted and 2-flowered: corolla yellow, 3 lines long, twice the length of the calyx: pod narrow, compressed, an inch or more in

length, 5- to 7-seeded: seeds from orbicular to oval, compressed, the surface covered with a minute and low tuberculation.

At Los Angeles Bay, Lower California, 1887, Dr. Edward Palmer, No. 602, distributed as "*Hosackia strigosa*."

10. L. RUBELLUS. *Hosackia rubella*, Nutt., Torr. & Gray Fl. i. 326 (1838). *H. strigosa*, Gray in part, not of Nuttall. Prostrate, slender, branching freely, strigose-pubescent or nearly glabrous: leaflets 6 to 10, linear-oblong, mostly acutish: peduncles usually shorter than the leaves, bractless and 1-flowered, the later longer, bracted and 2-flowered: corolla reddish, scarcely twice the length of the calyx: pod slender, straight, 7- to 10-seeded; seeds quadrate, minutely tuberculate.

Plentiful in sandy soils, at San Francisco, Alameda and far southward, but apparently only toward the sea; not in the interior. Readily distinguished from all its allies by the only faintly tuberculate square seeds and small reddish corolla.

11. L. NUDIFLORUS. *Hosackia nudiflora*, Nutt. l. c. Much like the preceding in habit, foliage, etc., but flowers thrice as large, yellow: pod broader, more compressed, not straight but curved upward at apex: seeds larger, simply quadrate, faintly tuberculate.

Of more southerly distribution than the last, and belonging equally to the seaboard and the interior.

12. L. STRIGOSUS. *Hosackia strigosa*, Nutt. l. c.; also of Gray, Brew. & Wats. excl. syn. *H. microphylla*, *nudiflora* and *rubella*. Strigosely pubescent, much branched, decumbent or prostrate: peduncles elongated, usually 1- or 2-flowered and 3-foliolate-bracted: corolla yellow, 4 or 5 lines long: pod pubescent, slightly curved upwards at the apex: seeds quadrate but somewhat cruciform, being deeply notched at each end and at the hilum, the surface closely sinuate-rugose.

From Monterey southward near the sea; but also on gravelly hills of the Mt. Diablo range, near Byron, and perhaps still farther northward. Very easily recognizable by the remarkable configuration of the seeds.

13. L. HIRTELLUS. Stoutish, depressed, canescently hirsutulous, not at all strigose: leaflets 5 t 7, cuneate-oblong or -obovate, obtuse: peduncles stoutish, bracted, surpassing the leaves, 2-flowered: pod straight, an inch long, subterete, 7- to 10-seeded: seeds quadrate, notched at the hilum only, the surface faintly rugose and coarsely tuberculate.

High ridges of the mountains north of Hetch-Hetchy Valley in the Sierra Nevada, California; collected by Messrs. Chesnut and Drew, 29 June, 1889. A very distinct species, perhaps not rare, and very likely to have been confounded with *L. strigosus* in the herbaria; though the pubescence is very different, and the seeds strikingly so.

++ ++ *Perennials.*

14. L. RIGIDUS. *Hosackia rigida*, Benth. Pl. Hartw. 305 (1849); Gray, Proc. Acad. Philad. 1863, 348. Stems rigid and flexuous, with long internodes, herbage silky-canescent: leaflets 3 to 5, cuneate-oblong or obovate, crowded on a very short rachis, the whole leaf subsessile: peduncles elongated, rigid, 1- to 3-flowered; supporting a small 1- to 3-foliolate bract: corolla ½ inch long; calyx-tube cylindrical, 3 lines long: the subulate teeth not as long: pod thickish, subterete, an inch long.

Founded on a specimen of Coulter said to have come from Monterey; but the only plants answering well to the description are from the extreme south of the State and the peninsula beyond.

15. L. PUBERULUS. *Hosackia pubernla*, Benth. l.c. Branched from the base and decumbent, appressed-pubescent: leaflets 4 or 5, oblong or linear, crowded as in the last: peduncles exceeding the leaves, 1- or 2-flowered, the bract 1- to 3-folio-

late : calyx-tube 2 lines long, the superior teeth longer, all softly villous on the margin ; corolla 7 lines long ; pod 1 inch.

Northern Mexico ; the original from Zacatecas. Pringle's 433 from southwestern Chihuahua answers well to Bentham's description of the species ; and nothing like it has come in from within the borders of the United States.

16. L. Wrightii. *Hosackia Wrightii*, Gray, Pl. Wright. ii. 42 (1853). Erect, slender, fastigiately branched, a foot high, the growing parts silky-pubescent, at length glabrate : petiole nearly obsolete as in the preceding ; leaflets 3 to 5, linear or oblong, acute : peduncles either extremely short or equalling or surpassing the leaves, 1- to 3-flowered, the bract 1-foliolate : calyx-teeth subulate-setaceous, as long as the oblong-campanulate tube : corolla $\frac{1}{2}$ inch long, yellow or orange, changing to red : pod straight, silky-pubescent.

Common in open forests of pine, etc., in the mountains of middle or northerly districts of Arizona and New Mexico ; occupying higher altitudes than the other *Loti* of the region ; flowering in summer only.

17. L. mollis. *Hosackia puberula*, var. nana, diffusa, magis cinerea, etc., Gray, Pl. Wright. ii. 42. *H. mollis*, Greene, Bull. Calif. Acad. i. 185 (1885). Densely villous with short spreading hairs : stems numerous from a suffrutescent base, slender, mostly prostrate ; leaves sessile ; leaflets 3 to 5, narrowly oblong to linear, acute, crowded on a very short rachis : peduncles erect, slender, an inch or two long, usually bractless, 1- or 2-flowered : calyx-teeth linear-subulate, a little longer than the tube : corolla $\frac{1}{2}$ inch long, light yellow, drying reddish : pod an inch long or more, straight, velvety-pubescent : seeds orbicular.

Open grassy places, or gravelly knolls on the plains and among the foothills of the mountains of southern New Mexico, Arizona and northern Mexico. Totally unlike the preceding in pubescence, habit, and in its distribution over the country which they both inhabit. Flowering in March and April.

18. L. Neo-Mexicanus. Much branched from the base, the slender and somewhat rigid branches ascending, 6 or 8 inches long: canescent with a minute somewhat silky tomentum: leaves short-petioled; leaflets 5 or 6, cuneate-oblong, obtuse: peduncles slender, twice the length of the leaves, 1-flowered, with or without a small 1-foliolate bract: calyx-teeth subulate, shorter than the oblong-campanulate tube: corolla 4 lines long, yellow: pod slender, 1 inch long, pubescent, curved upwards; seeds numerous, smooth, truncate at the ends and broader than long.

A most distinct species, known to me only by a single but perfect specimen which I must have collected near Silver City, New Mexico, in the spring of 1877.

19. L. Mearnsii, Britt. in herb. *Hosackia Mearnsii*, Britt. Trans. N. Y. Acad. viii. 65 (1889). This is another excellent species of the southwestern frontier, related to *L. Neo-Mexicanus*, but a more erect plant, silvery-white with a dense appressed pubescence, the leaves and flowers twice as large as in the above, the broad leaflets very obtuse or even truncate.

20. L. argyræus. *Hosackia argyræa*, Greene, Bull. Calif. Acad. i. 184 (1885). Slender and diffuse, the leaflets acute; otherwise much like the last. From San Bernardino (Parish) southward to near the middle of the Lower Californian peninsula.

21. L. Cedrosensis. *Hosackia flexuosa*, Greene, Bull. Calif. Acad. i. 82 (1885); Pittonia. i. 202. Known only from Cedros Island. where it has been collected by Dr. Veatch, Lieut. Pond, and the present writer; particularly well marked by its rigid zigzag branches with short internodes. The *L. flexuosus*, Lam., precludes the retention of the specific name given under *Hosackia*.

22. L. Guadalupensis. *Hosackia grandiflora*, Greene, Bull. Calif. Acad. i. 222, not of Benth. Branches stout, erect,

2 feet high, from a suffrutescent base, and with the other parts minutely velvety: internodes short, not equalling the sessile leaves: leaflets about 5 pairs, obovate-oblong, mucronulate: peduncles stout, surpassing the leaves, the 6- to 10-flowered umbel with a large 1-foliolate bract: calyx-teeth subulate-setaceous, rather shorter than the oblong-campanulate tube: corolla 6 to 7 lines long, yellow.

Dr. Palmer's No. 23 (of Watson's list), called "*Hosackia grandiflora*," I have not seen. It was reported as growing "among trees in the middle of the island." My plant, of which only one specimen was seen, and that a large bushy one, was probably wholly destroyed by the Indian who, scaling the precipice on the face of which it grew, gathered everything except the woody base. It is singular among the species of this group in having numerous leaflets equally distributed on the rachis; so that only on account of its gland-like stipules is it retained in this place. But it is very closely related to the next, though more remote from the true *L. grandiflorus*.

23. L. LEUCOPHÆUS. *Hosackia grandiflora* var. ? *anthyloides*, Gray, Proc. Philad. Acad. 1863, 350. A low velvety-pubescent plant with short peduncles and short internodes, the handsome flowers a half inch long, ochroleucous, changing to red-purple. It is common on dry ridges, in the pine and manzanita belt of the Coast Range in California from Solano County, California, southward to San Diego. Mr. Parish sends specimens from his district (No. 1978) with the calyx-teeth remarkably dilated. They are very attenuate in the more typical forms.

24. L. GRANDIFLORUS. *Hosackia grandiflora*, Benth. Trans. Linn. Soc. xvii. 366 (1836). A tall slender, usually almost glabrous species, with long internodes, greatly elongated peduncles, bearing umbels of bright yellow flowers; the corolla commonly almost an inch long. Far less common than the preceding, and of more limited range. The two

approach each other in aspect, in many forms; but it is impossible for a Californian botanist to regard the extremes as mere variations of one species.

25. L. MACRANTHUS. *Hosackia macrantha*, Greene, Bull. Calif. Acad. i. 81 (1885). While this may be an extreme form of *L. grandiflorus*, no writer has credited that species with foliaceous stipules which are caducous, leaving a permanent gland-like scar. It was on this character chiefly that I relied when proposing the species as new; nor have I yet found such stipules in any form of undoubted *L. grandiflorus*. The present plant, then, joins this group to the next with scarcely a break.

* * * *Perennials with true stipules; leaflets distributed equally on opposite sides of a linear rachis; flowers in bracted umbels; pods long, straight, subterete, tardily dehiscent.*—Types of Genus HOSACKIA, Benth.

26. L. ANGUSTIFOLIUS, Mog. & Sesse. *Hosackia angustifolia*, Don. Gen. Syst. ii. 200 (1832). A Mexican species.

27. L. CHIHUAHUANUS. *Hosackia Chihuahuana*, Wats. Proc. Am. Acad. xxiii. 270 (1888). Also Mexican, and of recent discovery, though first collected by Mr. Alphonse Forrer, above Durango, Oct. 1881.

28. L. LATHYROIDES. *Hosackia lathyroides*, Dur. & Hilg. Pac. R. Rep. v. 6. t. 3 (1853). An excellent species of the southern part of California. Perhaps somewhat rare; at least seldom collected. We have it recently from Dr. A. Davidson, who finds it near Los Angeles.

29. L. OBLONGIFOLIUS. *Hosackia oblongifolia*, Benth. Pl. Hartw. 305 (1849). Mountains of southern California.

30. L. TORREYI. *Hosackia Torreyi*, Gray, Proc. Am. Acad.

viii. 625 (1873). In the Sierra Nevada of middle and perhaps southern California.

31. L. PINNATUS, Hook. Bot. Mag. t. 2913 (1829). *Hosackia bicolor*, Dougl. in Lindl. Bot. Reg. t. 1257 (1829). Common at middle elevations of both the Coast Range and the Sierra, from central California to Washington.

32. L. FORMOSISSIMUS. *Hosackia gracilis*, Benth. Trans. Linn. Soc. xvii. 365 (1837). In moist ground in open or shady places, along the seaboard from Monterey to the Columbia. The most beautiful species; the keel and widespread wings rose-red, the banner bright yellow. There is an European *Lotus gracilis*, W. & K.

33. L. CRASSIFOLIUS. *Hosackia crassifolia*, Benth. Trans. Linn. Soc. l. c. From Kern Co., California, to the Columbia, in the mountains. The largest species; with dull purple flowers marked with greenish. As received perhaps including two species.

34. L. STIPULARIS. *Hosackia stipularis*, Benth. l. c. In the hilly country of middle California, to the westward. Apparently of limited range, and seldom seen or collected.

35. L. INCANUS. *Hosackia incana*, Torr. Pac. R. Rep. iv. 79. t. 4 (1857). In open places among the pine woods in Nevada Co., California. Common enough in the vicinity of Nevada City, but apparently of restricted range.

* * * * *Herbs or suffrutescent plants with dot-like stipules; foliage of few and inequilaterally distributed leaflets; flowers umbellate or solitary, the mature calyx deciduous with the indehiscent usually small arcuate slender-pointed few-seeded pods.*—Genus SYRMATIUM of Vogel.

† *Shrubs or perennials more or less woody at base.*

36. L. GLABER. *Syrmatium glabrum*, Vogel, Linnæa, x. 591 (1836). *Hosackia scoparia*, Nutt. in Torr. & Gray, Fl. i. 325 (1838). *H. glabra*, Torr. Wilkes Exp. 274. Coast Range, throughout middle and perhaps southern California; forming dense, bushy tufts, and reedy-looking when out of flower.

37. L. JUNCEUS. *Hosackia juncea*, Benth. Trans. Linn. xvii. 366 (1837). Of more southerly distribution than the preceding, and less common; distinguished by very short and blunt calyx-teeth.

38. L. NUDATUS. *Syrmatium nudatum*, Greene, Pitt. i. 173 (1888). Cedros Island, Mexico. Both leaves and flowers greatly reduced; calyx-teeth linear-subulate, erect, half as long as the tube.

39. L. BENTHAMI. *Hosackia cytisoides*, Benth. Trans. Linn. Soc. l. c. San Francisco. Monterey, etc. Readily distinguishable from No. 36 by its prostrate habit, and longer slender recurved calyx-teeth.

40. L. VEATCHII. *Hosackia Veatchii*, Greene, Bull. Calif. Acad. i. 83 (1885). *Syrmatium patens*, Greene, Bull. Calif. Acad. ii. 147 (1886). Coast of the peninsula of Lower California: also on the islands off Santa Barbara, Calif. Inadvertently redescribed on specimens from the northern habitat, where it was collected last. The original locality has not been revisited since Dr. Veatch's time.

41. L. DENDROIDEUS. *Syrmatium dendroideum*, Greene. Bull. Calif. Acad. ii. 146 (1886). Santa Cruz Island, off the coast of California: an erect almost arborescent species.

42. L. NIVEUS. *Syrmatium niveum*, Greene, l. c. 148. Habitat of the preceding, and seeming as if on the verge of extinction when discovered in 1886.

43. L. ORNITHOPUS. *Hosackia ornithopus*, Greene, Bull. Calif. Acad. i. 185 (1885). Guadalupe Island.

44. L. DISTICHUS. *Hosackia disticha*, Greene. l. c. Sandy coasts of middle Lower California.

45. L. WATSONI. *Hosackia Watsoni*, Vasey & Rose, Proc. U. S. Mus. xi. 528 (1889). Habitat of the preceding.

46. L. HAYDONI. *Hosackia Haydoni*, Orc. W. Am. Sc. vi. 63 (1889). Borders of Colorado Desert, southern California.

47. L. ARGOPHYLLUS. *Hosackia argophylla*, Gray. Mem. Am. Acad. v. 316 (1854). Foot-hills of the Sierra Nevada, California, but southward only.

48. L. LEUCOPHYLLUS. *Hosackia sericea*, Benth. Trans. Linn. Soc. xvii. 367 (1837). Monterey Co., Calif. Seldom met with, and seeming to be confined to the country about Monterey. Calyx-teeth short, but slender; stems long and diffuse; species no doubt related to *L. glaber*, but silky-canescent throughout.

49. L. NEVADENSIS. *Hosackia decumbens*, var. *Nevadensis*, Wats. Bot. Calif. i. 138 (1876) *Syrmatium Nevadense*, Greene, Bull. Calif. Acad. ii. 148 (1886). In the Sierra Nevada from the neighborhood of Donner Lake southward to San Diego Co., plentiful in dry open pine woods.

50. L. DOUGLASII. *Hosackia decumbens*, Benth. Bot. Reg. xv. under t. 1257 (1829). From Humboldt Co., Calif. (*Drew & Chesnut*) northward to Washington. One of the species discovered in early years by Douglas; and it may be dedicated to him, there being already a *Lotus decumbens*, Poir.

51. L. PROCUMBENS. *Hosackia procumbens*, Greene, Bull. Calif. Acad. i. 82 (1885). At high elevations on the mountains west of the Mohave Desert, Calif. In aspect much like *L.*

leucophyllus, but calyx-teeth very broad and short; pubescence much thinner and lighter, the pods entirely straight (contrary to the character of the group) and almost an inch long. Stem scarcely or not at all woody at base.

+ + *Annuals.*

52. L. TOMENTOSUS. *Hosackia tomentosa*, Hook. & Arn. Bot. Beech. 137 (1836). *Syrmatium tomentosum*, Vogel in Linnæa, x. 591 (1836). From San Francisco southward along the seaboard to Monterey.

53. L. HEERMANNI. *Hosackia Heermanni*, Dur. & Hilg. Pac. R. Rep. v. 6. t. 4 (1855). From San Francisco to San Diego.

54. L. NUTTALLIANUS. *Hosackia prostrata*, Nutt., Torr. & Gray, Fl. i. 325 (1838). Along the seaboard in southern California, extending down the peninsular coast. The specific name *prostratus* is long preoccupied in *Lotus*.

55. L. HAMATUS. *Hosackia micrantha*, Nutt. l. c. 324. Same range as the last; the leaves and flowers in both very small, but the plants by no means diminutive. The present species is found as far inland as Colton by Mr. Parish (No. 2072). Its pods, not hitherto described, are more than $\frac{1}{2}$ inch long, including the rigid mainly straight, but abruptly uncinate-incurved beak, and contain at base only a single seed, this slender, cylindrical, either straight or more or less curved. I have the mature fruit only from Dr. H. E. Hasse of Santa Monica.

The above Enumeration does not embrace quite all the species which have been published under the name of *Hosackia*. But the few which I have omitted are either unknown to me or held as very doubtful.

Revision of the Genus Diplacus.

The type of this beautiful genus of West American shrubs was in cultivation in Europe before the end of the last century, and had been figured admirably in several botanical publications, from specimens grown in the conservatories, where it appears to have flowered as luxuriantly as could have been desired, but without producing seeds. Owing to a close analogy between its leaves, inflorescence, calyx and corolla and those of the genus *Mimulus*, it was referred to that genus by Wendland, Jacquin, Curtis and others.

Nuttall was the first critical botanist to see and study these shrubs in their native soil, and to learn the striking characteristics of their fruits; characteristics which determine them to be of a genus wholly distinct from *Mimulus*. This author proposed *Diplacus* in 1837, publishing its characters, together with an account of the several species recognized by him, in the first volume of the "Annals of Natural History." London, 1838.

That the genus was based on sufficient characters, seems to have been evinced by the fact that it was at once adopted by such eminent authorities as Sir William Hooker, and Endlicher, who gave it its place in his Genera Plantarum, and Bentham, who revised it for the Prodromus of De Candolle. The last named author afterwards, in his Genera Plantarum. reduced both *Diplacus* and his own equally valid *Eunanus* to the rank of subgenera under *Mimulus*. But in this, as he acknowledges, he followed the counsel of his friend Asa Gray, who had reported some transitional forms of fruit-structure, linking the capsules of *Eunanus* to those of *Diplacus*, and those of both to *Mimulus*.

The capsules of all these plants are still rare in eastern and Old World herbaria; most of the specimens, whether of

Diplacus or *Eunanus*, lacking the mature fruit. The present writer, with his advantages of long residence in the regions inhabited by these plants, is not yet acquainted with any transitions between the capsules of *Diplacus* and those of either *Mimulus* on the one hand, or *Eunanus* on the other; and, during the five years which have elapsed since he proposed the reinstatement of both these genera,[1] he has met with no facts not confirmative of the view then set forth.

Mimulus in all its several phases has its placentæ (theoretically two) firmly, and in so far as I know permanently, coherent, thus forming a central column in the midst of the capsule, whose valves at first separate by a slight parting of their edges at the natural suture, ultimately breaking away irregularly and piecemeal from the placentiferous central axis. In *Diplacus* there is no such axis. The firm valves, parting at first only by the upper suture, lie open like a boat-shaped follicle, each bearing its own distinct placenta, and that with a broad thin spreading margin which almost conceals the seeds. That this pod, at first boat-shaped by a partial dehiscence, is held in this shape by a tubercular enlargement of the base of the style, I have stated in the earlier paper cited in the foot-note. The close-fitting calyx of *Diplacus* is ruptured by the dehiscence of the pod. In *Mimulus* the calyx invests the capsules very loosely, and the capsules have neither a texture nor a dehiscence to interfere with the calyx.

The corolla of *Diplacus*, though varying much in the different species, has what may be called its own generic cut; and there is no approach to this general kind of configuration in either *Mimulus* or *Eunanus*, though in both these genera, each now embracing scores of species, there is great diversity in respect to the shape of this organ.

The vegetative characters of *Diplacus* are excellent; and there are no transitions to either of the aforenamed genera through these. There are no shrubby, or even suffrutescent

[1] Bull. Calif. Acad. i. 94 & 96.

Mimuli or Eunani; nor are there any herbaceous or half-shrubby Diplaci. *Diplacus* has a completely revolute vernation; the young leaves in all Mimuli are more or less distinctly conduplicate, never revolute. The resinous exudation common to all species of *Diplacus*, and which is most copious in those species which have least pubescence, is totally absent from *Mimulus* and *Eunanus*; though the latter has that very different thing, a glandular pubescence, and the former displays in many species, a slimy, but not resinous, exudation or pubescence.

What has misled those authors who have retained these shrubs in *Mimulus*, has been the strong analogy which they bear, when seen in leaf and flower, to the Atlantic American and typical *Mimulus*. They do not at all so nearly resemble the yellow-flowered *Mimulus* of Pacific America; for these species have broad, and for the most part, parallel-veined leaves, and are pale flaccid more or less slimy and musk-scented herbs, so very unlike the typical *Mimulus* that I formerly set them apart as a subgenus Simiolus, and often think they should, along with their South American kindred—*M. luteus*, Linn., being the type of the whole group—be distinguished as a genus by themselves. But that this general likeness which the *Diplacus* species bear to *M. ringens*—although it misled Mr. Bentham so completely that, in the Scrophularineæ Indicæ, he placed them in the type-section of the genus *Mimulus*—that this is but an analogy, and not an indication of close affinity, is proven by the different vernation of *Diplacus*: and it was at last acknowledged by Dr. Gray himself—and that without knowledge of the vernation—for, in the Supplement to the Synoptical Flora, he says of the various "subgenera" of *Mimulus*: "*Diplacus* is placed first, as having the best claims to generic distinction."

Although the genus is, to my mind, one of the clearest—far more naturally distinct from *Mimulus* than *Pentstemon* from *Chelone* or *Orthocarpus* from *Castilleia*, or *Synthyris* from *Wulfenia*—the species are not as well defined; or at least, not so easily definable in writing. But this difficulty I

fancy lies largely in the fact that the configuration of the corolla in the different species eludes the eye which has but the distorted and shrunken herbarium specimen in view. It is certain that, in respect to this organ, there are wide and constant differences, and descriptions that shall be diagnostic will be drawn up only with the fresh corollas of the different shrubs in hand.

The following account of the species, although doubtless better than that given by me in 1885, is not altogether satisfactory.

* *Corollas buff or pale salmon-color.*

1. D. GLUTINOSUS, Nutt. in Hook. Bot. Mag. under t. 3655, and Ann. Nat. Hist. i. 138 (1838); Benth. in DC. Prodr. x. 368 (1846); Greene, Bull. Calif. Acad. i. 95 (1885). *Mimulus glutinosus*, Wendl. Obs. 51. and Jacq. Hort. Schœnbr. iii. t. 364 (1798); Willd. Sp. iii. 361 (1800); Benth. Scroph. Ind. 28 (1835). *M. aurantiacus*, Curt. Bot. Mag. t. 354 (1797 ?). *Diplacus latifolius*, Nutt. l. c. *D. stellatus*, Kell. Proc. Calif. Acad. ii. 18 (1863); Greene, Bull. Calif. Acad. i. 95. In the type of this species, well figured by Curtis long ago, and most beautifully and perfectly represented in Jacquin's Hortus Schœnbrunnensis, the leaves are thinnish as compared with the other species, of oblong-lanceolate outline, obtusish, with a margin saliently erose-dentate or somewhat serrate, not revolute; the lower face, as seen under a strong lens, thickly covered with minute resinous globules, these usually sessile, but some of them raised on very short simple hairs. The profuse pubescence, also confined to the growing parts of the stem and lower face of the leaves, is intricately branched, but not from the base. Each separate hair is dendroid.

The pattern of the corolla, very correctly given in the plates above cited, does not exactly recur in any of the other species. The nearest approach to it is made in *D. puniceus*; but even here it is modified, the lobes being narrower. The

type of this species is northern, ranging from perhaps Monterey to southern Oregon; most plentiful toward the coast, but common in the interior, on both sides of the Sacramento valley. I refer to it with misgiving two other plants as varieties.

Var. STELLATUS. *Diplacus stellatus*, Kell. Proc. Calif. Acad. l. c. Greene, Bull. Calif. Acad. l. c. Shortly after having proposed the restoration of this species on the score of its accredited stellate pubescence, I collected it anew, and seemed to find that the stellate hairs on my own specimens as well as on those obtained by Dr. Veatch—hairs so extremely unlike what are found elsewhere in the genus, had been derived by accident, from an extraneous source. They are, I think, those of a *Sphæralcea* which grows on Cedros Island along with the *Diplacus*. A dendroid tomentum quite as dense as what is found on the far-southern shrub, occurs on others from Calaveras Co. in middle California. But the leaves of *stellatus* are broader and more inclined to the ovate, than in any mainland form, besides being of much firmer texture; and the flowers are smaller. These considerations, taken in connection with the remote insular habitat, may with some suffice to establish the shrub in specific rank. But I am not overconfident that the very pubescent *D. glutinosus* of the interior may not be found to run far southward even to the peninsular mountains over against Cedros. The vast stretches of Californian mountain territory not yet at all explored, leave room for many facts to be discovered in the future.

Var. LATIFOLIUS. *Diplacus latifolius*, Nutt. l. c. ? Greene, l. c. I know no more of this than was known five years ago. The leaves of the plant, and its pubescence, are as in true *glutinosus*; but the corolla is certainly of another cut: though from the herbarium specimens—and these are scant. I could not attempt to describe it, further than to say, that the lobes seem almost obsolete, and the apparently rounded limb erose-dentate.

2. D. LONGIFLORUS, Nutt. ll. cc. *D. arachnoideus*, Greene, Bull. Calif. Acad. i. 210 (1885) and ii. 409. Leaves thin, plane and erose-dentate or (according to exposure) thicker and revolute; calyx and growing parts more or less soft- and even cobwebby-tomentose above the coating of resinous globules: corolla ample, more than twice as large as in the last, nearly white with a tinge of pink-buff, the lobes quadrate-oblong, obliquely emarginate and slightly toothed: style-base not tuberous.

Plentiful from Santa Barbara and the islands adjacent, southward to Lower California; the tomentose pubescence often obsolete, but the species always distinguishable by its large pale corollas of distinctive pattern.

3. D. LINEARIS. *Mimulus linearis*, Benth. Scroph. Ind. 27 (1835). *Diplacus leptanthus*, Nutt. ll. cc. (1838): Greene, Bull. Calif. Acad. i. 96, partly. Leaves sub-coriaceous, linear-lanceolate, revolute, the lower face covered with resin-dots and bearing few short forked or triple-branched hairs, the herbage otherwise glabrous: corolla narrow and pale, but longer than in *D. glutinosus*; style-base slightly swollen.

Common in southern California (*Clereland*, 418) and on the peninsula (*Orcutt*).

Because the leaves are not linear Mr. Nuttall would have changed the name to *lepanthus*, a term more diagnostic: for, by the pattern of the corolla more than by the narrow revolute leaves, the species is distinct from *D. glutinosus*.

4. D. GRANDIFLORUS. *D. longiflorus*, Greene, Bull. Calif. Acad i. 96, mainly, not of Nuttall. Low and decumbent: branches and peduncles minutely puberulent, the hairs simple, stiff, deflexed: leaves oblong-lanceolate, obtuse, entire, the margin revolute, neither face either pubescent or at all resiniferous-glandular: corolla 2 inches long, with ample funnel-form throat and scarcely more abruptly spreading but deeply divided and subdivided limb.

I have no specimen of the Santa Barbara plant mentioned

in the place above cited, but believe that to have been the true *longiflorus*. What I now find to be of a species hitherto unrecognized, comes from Monterey Co. (*Hickman*) and from the foot-hills of the Sierra Nevada in Yuba Co., California. In pubescence, and also in respect to the pattern of the large Salpiglossis-like corolla, it is exceedingly unlike any of the plants described by Nuttall or by any one else. The herbage is of that dark green which is otherwise found only in the next species.

* * *Corollas blood-red, or scarlet.*

5. D. PUNICEUS, Nutt. ll. cc. *Mimulus puniceus*, Steud. Nom. and Gray, Syn. Fl. Supplem. 442. Differs from *D. glutinosus*, as indicated under that species, in the cut of the corolla, as well as in its color; leaves also narrow, firmer and always with revolute margins; style-base, moreover, not in the least tubercular.

Very common in San Diego Co., Calif., its further range, if it have any northward or southward, not reported.

6. D. PARVIFLORUS, Greene, Pitt. i. 36 (1887). Related to the last, but most distinct: the leaves much broader than in any other species, and the small corollas, the limb of which is scarcely at all spreading, forbid our regarding it as a mere variety of the mainland red-flowered species. It is hardy under cultivation at Berkeley, where it grows more vigorously, but does not otherwise diverge at all from the wild type, which is endemic on Santa Cruz Island.

IX.

Sagittaria Sanfordi. Herbage glabrous, of a pale yellowish green: phyllodes 3 to 5 feet high, very stout (often $1\frac{1}{2}$ inches thick toward the base), obtusely triquetrous throughout, with or without a rudimentary lamina; this when present, 2 or 3 inches long, elliptic-lanceolate, acuminate, and with 4 or 6 manifest veins running parallel to the midrib: scape stout, many-flowered; raceme ample, large-flowered: filaments dilated, shorter than the anthers: achenes very numerous in a large depressed head, cuneate-quadrate, with a short triangular beak: both margins, as well as one or more of the lateral angles, scarious-winged.

A coarse aquatic very abundant in the sloughs of the lower San Joaquin about Stockton, California; there associated with *S. variabilis*, the two forming masses apart from each other, the yellow-green phyllodes of the new one deceiving the eye to the extent of having long passed with us for the foliage of the common *Sparganium* of the region. Dedicated to Mr. J. A. Sanford, a resident of Stockton, who is greatly augmenting our knowledge of the vegetation of a peculiar district which had been too long neglected.

Lathyrus Jepsoni. From 5 to 8 feet high, the stems strongly winged along the angles and striate between them: herbage nearly or quite glabrous: leaflets 8 to 12, linear-lanceolate, acute, 2 or 3 inches long, coriaceous, conspicuously venulose: stipules small and narrow, setaceously acuminate: peduncles stout, about equalling the leaves (often a foot long): flowers rose-purple, changing to a deeper color: calyx-teeth ovate-lanceolate, the lower not greatly elongated: corolla $\frac{3}{4}$ inch long, relatively broad: pod 2 or 3 inches long, sessile in the calyx, 12- to 16-seeded.

Common along the muddy margins of tide-water sloughs in the Suisun marshes, also toward Stockton; long known to the author, recently collected by Mr. Jepson.

Notes on some Western Cherries.

Cerasus demissa, Nutt. in Torr. & Gray, Fl. i. 411. Although this western Choke-Cherry has everywhere been received as distinct from its eastern analogue, *C. Virginiana*, there is evidence that herbarium specimens of the western shrub have been referred to the eastern species, and that so *C. Virginiana* has come to be credited with a westerly range which I am confident it does not take. In my more than twenty years' botanical experience between the western base of the Rocky Mountains and the shores of the Pacific Ocean, I have seen nothing which I could call *C. Virginiana;* and, while that species is said to occur on the eastern slope of the Rocky Mountains, the western shrub which, all points considered, makes the nearest approach to it is not that of Colorado and Montana, but that of the Pacific coast, namely, the very type of *C. demissa.*

While apprehending that we may have, in the far West, two distinct species, one belonging to the Rocky Mountain region only, the other as exclusively restricted to the Pacific slope proper, I am not in possession of data sufficient for their segregation; but I can at least offer points by which the perhaps composite *C. demissa*—the aggregate Western Choke-Cherry—may be more clearly distinguished from the eastern, and the name of *C. Virginiana* be expunged from the list of Rocky Mountain shrubs, as I doubt not it should be.

True *C. Virginiana*, as I used to know it, was a rather graceful arborescent shrub or small tree, with smooth bark and slender divergent or spreading branches and twigs, thin foliage, and short racemes of small flowers; and its favorite habitat was shady ravines and river-banks. The open arborescent mode of growth, and the thinness of the foliage,

would become the most striking of its characteristics when contrasted, in the flowering state, with its western analogue; for this is comparatively a rigid ungraceful clumpy bush with dark roughish bark, few and ascending branches, and a foliage which in its maturity is firm enough to be described as subcoriaceous. In the Rocky Mountain form the leaves are almost as broad as in *C. Virginiana;* hence, no doubt, the confusion of these two in the herbaria: but in the original *C. demissa* of the farther West there is a decidedly longer and relatively narrower foliage, though its texture is less firm, and more like that of the eastern shrub; the branches more elongated and divergent than in the bush of Colorado and the Rocky Mountain plateau: moreover, this like *Virginiana* sometimes approaches the form and dimensions of a small tree. But the western aggregate is more inclined to be pubescent; and the foliage, when perfectly mature, is almost white beneath, as if covered with a permanent bloom. Of this whiteness there is nothing to be seen in my fruiting specimens of *C. Virginiana.* It is also more pronounced and conspicuous in the Colorado shrub than in that of the Pacific coast; indeed, I am not sure that its partial or total absence from the maturest foliage of true *C. demissa* may leave the Rocky Mountain form to take specific, or at least varietal rank. But this matter of lower surface color in the leaves, as well as color and quality of drupes, form of putamen, etc., is much in need of further investigation. Meanwhile, the constant differences of habit and leaf-texture, will suffice to distinguish the eastern from the western species, and to exclude *C. Virginiana* from the Rocky Mountain flora. It would, however, be very interesting to know how far eastward in Dakota, Nebraska or perhaps Minnesota, the Rocky Mountain Choke-Cherry perchance may run.

CERASUS EMARGINATA, Dougl. in Hook, Fl. i. 169. *C. Californica*, Greene, Fl. Fr. 50; Gard. & Forest, iv. 243. Since the initial pages of the Flora Franciscana were published,

Mr. Howell has sent me word that the same shrub which I had supposed to be almost peculiar to the Californian Coast Range, is common in the mountains of eastern Oregon and Washington, retaining there all the peculiarities I had ascribed to it. This is tracing it to the very locality whence Douglas derived his type of *C. emarginata;* and, since this is the only one of our Cherries to which the name is applicable, it becomes almost certain that I erred in giving it a name as a new species; although it must be admitted the leaves of our shrub do not answer to the "oval or obovate" outline, nor are they "biglandular at the base," as those of the original are said to be.

CERASUS MOLLIS, Dougl. l. c. *C. glandulosa*, Kell. Proc. Calif. Acad. i. 59. *C. emarginata*, Greene, Fl. Fr. l. c. and Gard. & Forest, l. c., not Dougl. How far this is in nature from being a mere variety of the preceding I have already shown. It rests on the best of characters, although the pubescence which suggested the name *mollis* is by no means constant; and in California the leaves are wholly glabrous. They are also thinner than in the northern type. Still, it is hardly probable that Dr. Kellogg's *C. glandulosa* even when better known will prove distinct from *C. mollis.* Mr. Howell, having long recognized in *emarginata* and *mollis* two thoroughly valid species, assures me that the last named attains not rarely the height of fifty feet.

NEW OR NOTEWORTHY SPECIES.

X.

BERBERIS PUMILA. A few inches to a foot high, stout and rigid, erect from the base, not sarmentose: leaves very thick and coriaceous; leaflets 1—5, the terminal one round-ovate,

the lateral ones obliquely ovate, all coarsely toothed, the teeth rigidly spinescent, conspicuously reticulate-veiny on both faces, pale and glaucous beneath, deep but dull green and glaucescent above : racemes short, terminal and axillary: berries small, very glaucous.

This is the "*B. repens*" of the books and lists upon Californian botany, though entirely distinct from that slender creeping shrub of the Rocky Mountains to which Lindley gave the name. Ours, though a dwarf, has the habit of *B. Aquifolium*, but the dull foliage of *B. repens*, though the texture is firmer than in either, and the leaflets are usually in threes. The berries are only about half as large as those of *B. repens* and *Aquifolium*. The species inhabits the Coast Range perhaps throughout California ; but south of Siskiyou County it is nowhere common, and is seldom collected. The most recent specimens before me were obtained near Waldo, Oregon, in 1889, by Mr. Thomas Howell.

TELLIMA SCABRELLA. Stems solitary, a foot high, slender, glandular-scabrous : leaves small, the lowest round-reniform, either 3—5-lobed, or 3-cleft or -parted, in age bearing each a rather large bulblet in the axil ; cauline 3 or 4, alternate, deeply cleft or parted : raceme lax ; pedicels nearly or quite equalling or even exceeding the calyx, this with a rounded and obtuse base, nearly free from the ovary : petals entire, 3 lines long, the 2 upper oblong, obtuse, shorter and broader than the 3 lower, all on rather slender claws : capsule very short, included in the broadly campanulate calyx ; styles manifest and slightly exserted, glabrous : seeds muriculate.

Pine woods south of Tehachapi, California, collected by the author in June, 1889 ; also in another part of Kern Co., a year earlier, by Messrs. Palmer & Wright ; Marysville Buttes, 1891, Jepson. Intermediate between *Cymbalaria* and *heterophylla*.

TELLIMA NUDICAULIS. Perennial, with tufted fibrous roots ; herbage glandular-scabrous : leaves all radical, rather firm

in texture, round-cordate, with shallow crenate lobes, 1 inch broad, on petioles of 1½ inches: scapes several, 12 to 18 inches high, naked below, racemose above: calyx obconic, the tube coherent with the ovary, in age oblong, ¼ inch long, constricted under the short lobes: petals white, obovate, entire, 2 or 3 lines long including the slender claw: stamens 5: stigmas 2, sessile on the scarcely beaked lobes of the ovary, these when mature scarcely exserted from the calyx: seeds smooth or slightly rugose.

Obtained near Deer Lodge, Montana, May 30th, 1889, by Rev. F. D. Kelsey. Nuttall appears to have had a manuscript *Lithophragma nudicaulis;* and this was referred by Gray to *Mitella trifida.* Our plant is from Nuttall's locality; but it is far from having either the petals or the capsule of any section of *Mitella.* It is a true *Lithophragma* in all respects save that the stems are leafless and scape-like.

Saxifraga Howellii. Perennial, slender, 3 to 5 inches high, glabrous: leaves very thin, oblong, mostly less than an inch long, tapering to a slender petiole of 1½ inches, the margin coarsely and evenly dentate: scapose stem corymbose-cymose at summit, the branchlets and pedicels subtended by small linear bracts: calyx cleft to the base, the segments narrowly oblong, obtuse, spreading in flower, reflexed in fruit: petals oblong, obtuse, white, changing to purplish: filaments linear-filiform, becoming purple: carpels divergent: seeds obscurely tuberculate.

On the Coquell River, Oregon, April 20th, 1891, Mr. Joseph Howell. A near relative of *S. occidentalis,* but a much smaller plant, the herbage of a purplish hue, the small white petals and filaments fading purplish.

Saxifraga Marshallii, Greene, Pittonia, i. 159. This excellent species, founded upon a small specimen from Humboldt County, California, appears to be common in Southern Oregon. Large and beautiful specimens of it were obtained in 1889, on Rogue River, by Mr. Thomas Howell; others nearly

as good were collected by his brother, Joseph Howell, near Woodville, in 1888, and on Coquell River early this year. The species is so much like *S. occidentalis* in foliage, size and general aspect, that it will easily be confounded with it if one overlook the clavate filaments and the unguiculate yellow-dotted petals.

SAXIFRAGA CALIFORNIA, Greene, l. c. 256. Common in both ranges of mountains throughout the entire length of California; Mr. Joseph Howell now sends it from near Roseburg, in Southern Oregon. It is very readily distinguished from both those above mentioned, and also from *S. reflexa* to which Dr. Gray at last referred it, by the strongly developed perigynous disk by which the ovary in the flower is made to appear very broad and flat-topped.

GAYOPHYTUM LASIOSPERMUM. Very slender, erect, 1 or 2 feet high, simple below, parted above into numerous dichotomous somewhat flexuous branches; glabrous except a scant pubescence on the flower-buds: leaves narrowly linear, $\frac{1}{2}$ to 1 inch long: corolla $1\frac{1}{2}$ lines broad, rose-color changing to rose-purplish: capsules linear-oblong, on capillary erect pedicels, few-seeded, torulose: seeds canescent with an appressed silky pubescence.

Near Julian, San Diego Co., California, Aug. 1888.

CHORIZANTHE NORTONI. Erect, a foot high or less, simple below, tri- and dichotomously corymbose at summit; canescently soft-pubescent: leaves in 1 to 3 whorls, narrowly oblanceolate, 1 to 2 inches long; bracts narrowly lanceolate, cuspidate: involucres solitary in the earliest forks, but at the ends of the branches disposed in large dense capitate clusters; tube triquetrous, with 3 intervening ribs; limb dilated and triangular, the three broad equal rose-purple segments acute or acuminate, ending in a short uncinate awn: perianths 2 or more, pinkish changing to rose-red; segments oblong, obtuse, very unequal: stamens exserted.

Near Gonzales, Monterey Co., California, May, 1891, A. Norton. A fine species, much like *C. membranacea* in habit, but more related to *C. Douglasii;* the involucres very peculiar. Those which are solitary in the forks have no colored margin to the segments. Those of the clusters seldom exhibit a trace of those three segments which should correspond to the secondary ribs, and so the limb is exactly triangular.

ERIOGONUM NORTONI. Near *E. truncatum*, but smaller, more branching, the stem branches and involucres glabrous, reddish in age: leaves whorled at the base of the stem and at the lower nodes, small and thick, broadly obovate or somewhat obcordate, cuneately but abruptly narrowed to a long slender petiole, glabrous above, white-tomentose beneath: involucres terminal upon the dichotomous branches and sessile in the forks, solitary, turbinate, $1\frac{1}{2}$ lines long, the 5 to 7 angles conspicuous, teeth short and blunt: flowers very numerous, white or rose-color, $\frac{3}{4}$ line long: sepals equal, obovate, nearly truncate.

Same station as the preceding, and by the same collector.

ERIOGONUM AGNINUM. Near *E. vimineum*, but larger and less diffuse, 1 or 2 feet high, the stem and branches glabrous: leaves all at base of stem, rather numerous, broadly oblanceolate, obtuse, strongly undulate, attenuate to a short petiole, hoary-tomentose on both faces, 2 or 3 inches long: involucres secund along the virgate branches, 1 line long, narrowly turbinate, rather prominently 5-toothed, many-flowered: flowers pale rose-color, $\frac{3}{4}$ line long; sepals equal, cuneate-obovate, obtuse or retuse.

Common on the northern slope of the Santa Inez Mountains, Santa Barbara Co., California.

ERIOPHYLLUM JEPSONII. Suffruticose, 2 feet high, the stem and branches white with a close pannose tomentum: leaves opposite or alternate, 1 to 2 inches long, pinnately divided into 5 to 7 narrowly linear revolute segments, glabrate above,

tomentose beneath: inflorescence loosely corymbose at the ends of the erect branches: heads 3 or 4 lines high and, with the expanded rays, 1 inch broad; involucral bracts 6 or 8, coriaceous, ovate; rays 6 or 8: achenes with a few short hispidulous hairs; paleæ of the pappus in 2 unequal sets, those of the inner circle much longer.

Mountains south of Livermore, California, May, 1891, W. L. Jepson. A strikingly well-marked species, combining the habit of *E. confertiflorum* and the scattered large heads of *E. cæspitosum*.

SENECIO HESPERIUS. Low, subacaulescent, apparently cespitose, 6 to 10 inches high, leafy only at the decumbent base, sparingly floccose-tomentose when young, in age nearly glabrous: leaves rather firm, from round-oval to oblong and oblong-lanceolate, ½ to 1 inch long, tapering to a short or long petiole, almost entire, or repandly or crenately few-toothed: scapose stem monocephalous, usually with one or more small sessile lanceolate bracts: head ½ inch high, with the expanded rays 1 inch broad; involucre campanulate, the bracts linear, outer calyculate ones few or none: rays 10 or 12, deep yellow: style-tips slightly penicillate.

Mountains of southern Oregon, Thomas Howell. Species recalling by its foliage *S. rapifolius* of Montana and Wyoming; intermediate between that and *S. Greenei* of middle California.

SENECIO RAWSONIANUS. Perennial, leafy at base, robust, 2 or 3 feet high, somewhat canescent with scattered short woolly hairs: leaves 6 or 8 inches long, ovate to lanceolate, acute, sinuately or laciniately toothed, or the upper repand-dentate: heads very numerous, in a somewhat fastigiate compound corymb; involucres nearly cylindrical, 4 lines high, the bracts oblong-linear, abruptly acuminate, the calyculate ones few and short: rays none: tubular corollas salmon-color, soon concealed by the accrescent and copious white pappus.

Forests of Fresno County, California, at middle elevations

in the Sierra. 1890, Mrs. L. A. Rawson Peckinpah. Related to *S. Whippleanus*, but the heads are small and disposed in a very ample compound corymb, and when well in flower appear white by the early lengthening of the pappus.

SENECIO WERNERIÆFOLIUS, Gray, Proc. Am. Acad. xix. 54. This species, common at middle elevations on the eastern slope of the Rocky Mountains of central Colorado, though not hitherto reported from elsewhere, was obtained last year in California; the locality, near the summit of Mt. Conness, one of the highest peaks of the Sierra Nevada, not far from the middle of the State; the collector Dr. George Davidson. At this new and surprising station—so very remote from the original one—the plants exhibit a rather narrower foliage, more elongated and slender scapes, narrower involucres and somewhat more showy rays.

ERIGERON MULTICEPS. *E. cæspitosus*, Vasey & Rose, Contr. U. S. Herb. i. 4, not Nutt. Near *E. divergens*, but perennial, the thick tap-root bearing a stout multicipital densely leafy caudex: herbage cinerous with a short and fine appressed pubescence: lowest leaves with obovate or oblanceolate entire abruptly acute lamina tapering to a petiole much longer, this gradually dilated at base; cauline oblanceolate to linear, sessile: stems slender, ascending, loosely corymbose: head 2 lines high; involucre hirsutulous: rays about 75, pale purple: pappus double, the short bristles of the outer row more or less squamately united, the elongated inner ones 5 to 8.

Collected in Kern or Tulare Co., Calif., in 1888, by Palmer & Wright (n. 121). Though a cespitose perennial, there is nothing about the plant to suggest to one experienced in the study of western Erigerons *E. cæspitosus*. In aspect and in character it is altogether like *E. divergens*. The mere flowering stems separated from the caudex, would pass unquestioned for those of that species.

ERIGERON CORONARIUS. Annual or biennial, strictly erect, simple up to the rather abruptly corymbose-paniculate sum-

Issued September 15, 1891.

mit, slender throughout, but rather rigid, about a foot high, scabro-puberulent: radical leaves (dead and gone at flowering time) oblong-lanceolate, scarcely an inch long, obtuse, entire with a few prominent teeth, short-petiolate; cauline narrowly linear, entire, sessile: heads 2 or 3 lines high: rays very numerous and slender, rather short: pappus double; the outer of 5 to 8 setosely fimbriate scales; inner of as many slender bristles.

This is n. 1275 of Mr. Pringle's Chihuahua collection of the year 1887, distributed as *E. divergens*. It is every way more like *E. Bellidiastrum*, and clearly enough distinct from both. The outer pappus is almost or quite that of *Achaetogeron;* the pappus-scales, if I mistake not, are more or less united at base, as in that too artificial genus.

If the bristles of the inner pappus had been wanting in the last named species, it would have been an *Achaetogeron*. The several species already admitted under that generic name are diverse in habit, each falling readily into some group of true *Erigeron*. In this genus I am persuaded they all naturally belong. They will there take names as follows:

Erigeron Wislizeni. *Achaetogeron Wislizeni*, Gray, Pl. Fendl. 72 (1849). Closely resembling *E. pumilus*.

Erigeron Seemannii. *Polyactidium Seemannii*, Schz. Bip.; Bot. Herald. 301 (1857). *Achaetogeron Seemannii*, Gray; Hemsl. Centr.-Am. ii. 120 (1881). Very intimately related to *E. delphinifolius;* and not only is the coroniform pappus here extremely reduced, but there are two or three conspicuous inner-pappus bristles. How, then, Dr. Gray could insist on placing this as an *Achaetogeron*, I am unable to conceive.

Erigeron Galeottii. *Achaetogeron Galeottii*, Gray; Hemsl. Bot. Centr.-Am. ii. 119 (1881). The published character of this species is insufficient to enable one to say where, under *Erigeron*, it should stand. It is said to be leafy-stemmed

and perennial; but no mention is made of the inflorescence, or size of the heads; and species of Asteroid Compositæ are not to be identified by that kind of a description.

ERIGERON FORRERI, *Achætogeron Forreri*, Greene, Pitt. i. 155 (1888). Apart from the stoloniferous nature of the stem at base, this plant is of the *Phœnactis* group, and near *E. Coulteri* or *salsuginosus*, though rather more leafy-stemmed than these.

ERIGERON STRIGULOSUS. *Achætogeron Palmeri*, Gray. Proc. Am. Acad. xxi. 386 (1886). An *Erigeron Palmeri* was published by Dr. Gray as early as 1879.

ERIGERON FRATERNUS. *Achætogeron affinis*, Gray, l. c. There is a Mexican *Erigeron affinis* of De Candolle.

ERIGERON CHIHUAHUANUS. *Achætogeron pinnatifidus*, Gray. l. c. The specific name *pinnatifidus* has been already twice employed in *Erigeron*.

ERIGERON AUREUS. *Aplopappus Brandegei*, Gray. Syn. Fl. i. 132 (1884). As his note shows, Dr. Gray could see that this plant is naturally an *Erigeron;* but his aversion to the idea of yellow-flowered species in this genus, overruled his first and, we think, better judgment. Although the rays are of a rich golden yellow, they are far too numerous and too narrow for those of an *Aplopappus*, and the plant is really next of kin—and very close—to the purple-rayed species. *E. lanatus*, Hook. An *Erigeron Brandegei* was published by Dr. Gray at the same time with the plant here commented upon.

ERIGERON STOLONIFER. Perennial, the bright green herbage apparently glabrous (but very sparsely pubescent under a lens); stem usually solitary, scapiform and monocephalus, 3 to 6 inches high; crown of the root producing a tuft of oblanceolate petiolate leaves an inch or two long, and a few

very slender leafy stolons, these rooting at the end, sometimes branching and proliferous, from a few inches to more than a foot long: head 2 lines high; rays very numerous, narrow, white or pinkish: pappus double; the outer and setulose bristles few and inconspicuous.

Common at lower and middle elevations in Rocky Mountains of Colorado; often collected, and always distributed as *E. flagellare*, with which Dr. Gray confounded it, but from the type of which it is entirely distinct. True *E. flagellare* (Fendler's n. 381, from New Mexico) is a coarser larger plant, cinereous-pubescent, bearing long flagelliform sterile leafy branches; but there are no stolons. There are wide differences in the pubescence; and the outer pappus in *E. flagellare* is much stronger and more copious. Although for twenty years I have known these as distinct species, only last year was I enabled to determine, by an examination of Fendler's n. 381, which would be the true *E. flagellare*. It is a plant of far more extended and southerly range than *E. stolonifer*, being as common along the arid Mexican border in Texas and southern New Mexico, as it is on the dry foothills of eastern Colorado. But the new species is limited to the Colorado region, in so far as I have seen, and is found only in moist gravelly or grassy lands along streams, or in mountain parks. By its stoloniferous growth and propagation, it comes to form extensive beds of matted trailing offsets, from the midst of which rise here and there the solitary scape-like peduncles.

ASTER ELMERI. Near *A. scopulorum* and *stenomeres;* the crown or caudex woody, without radical leaves; the tufted stems wiry but very slender, decumbent or almost prostrate, 5 to 8 inches long, sparsely leafy almost up to the solitary small head: leaves scattered, sparse, oblong-linear, acute, somewhat falcately upturned, rather pale with a short stiffish but appressed pubescence: head $\frac{1}{3}$ inch high; bracts of the involucre imbricated in about 2 series, linear, scabrous-puberulent and apparently viscidulous: rays purplish: achenes sparsely setulose-hairy (not villous): outer pappus of few unequal setulæ.

Obtained in the Grand Cañon of the Tuolumne River, California, in the summer of 1890, by Messrs. Victor Chesnut and Elmer Drew. A fine species, but adding another to the list of plants which are perplexingly ambiguous between *Aster* and *Erigeron*. This looks somewhat like a smaller and monocephalous *Erigeron Breweri;* but the involucre is imbricate as in *Aster*.

ARCTOSTAPHYLOS PATULA. Diffusely but somewhat irregularly and flexuously branching from the base, 3 or 4 feet high; stem and branches with a smooth red-brown close and not exfoliating bark: young twigs and the foliage glabrous, without bloom: leaves oval, entire, obtuse or acutish, mostly truncate or slightly cordate at base, 1 to $1\frac{3}{4}$ inches long, freely spreading or even somewhat pendulous (never vertical) on the petioles, these 4 to 6 lines long: racemes simple or slightly branching; the peduncle and small broadly subulate bracts glandular-puberulent: corolla short-subcylindrical, of a rich deep pink color: fruit (immature) depressed-globose: nutlets apparently coalescent into a deeply 5-lobed body.

The common manzanita of dry rocky ridges in pine woods of middle altitudes in the Sierra Nevada, California, from Calaveras Co. southward to Fresno; apparently not known to Dr. Parry; well marked in the character of its loose half-pendulous foliage, and deeply colored flowers.

ARCTOSTAPHYLOS MEDIA. Diffusely branching, the main divisions of the stem procumbent, a foot or two long; leafy branches ascending or erect, less than a foot high: leaves obovate-cuneiform, about an inch long exclusive of the short petiole, obtuse, puberulent beneath: racemes terminal, subsessile, few-flowered: fruit globose, slightly depressed, 3 or 4 lines broad; nutlets 5 to 7, firmly consolidated.

Native of Washington; communicated by Mr. Charles V. Piper, who says of it: "It is found rather sparingly on dry gravelly ground in Mason County, where both *A. tomentosa* and *uva-ursi* are very abundant, and always in a position to

indicate a hybrid origin. It is found most commonly in beds of *A. uva-ursi* with plenty of *tomentosa* near by, and is easily distinguished from *uva-ursi* by its larger size, merely procumbent (not prostrate) habit, and paler foliage." I have long had some flowering twigs of this shrub from Mr. M. A. Knapp, who collected them somewhere near the coast, in Washington, some three years since. These twigs, at the time of my receiving them, seemed to me to indicate an unknown species.

Rhododendron (Azalea) Sonomense. Near *R. occidentale* but every way smaller: leaves small, somewhat elliptical, 1 inch long or less, more or less pubescent, and, on the margin serrulate-ciliolate: flowers rose-colored and sweet-scented, one or two of the segments of the corolla with a narrow-elliptical deep salmon-colored spot in the middle.

Frequent, but mostly on dry slopes away from the streams, in the mountains of Sonoma Co., California, from Mount Saint Helena to the neighborhood of Petaluma; everywhere recognized by amateurs and florists as something quite different from the ordinary Californian *Azalea*, and no doubt specifically distinct, though hard to distinguish in the herbarium, by other marks than the small size, and pink color of the flowers. In *R. occidentale*, though the corolla-tube reddens in drying, the fresh flowers are pure white, except the yellow spot on the odd segment; they are nearly twice as large as in *R. Sonomense*, and are noted as exhaling what greatly detracts from their desirability, a faintly mephitic odor. This scent is strong enough to render the air quite other than balmy near where they grow. The new and little known shrub, avoiding the shades and stream-banks, grows on the open dry slopes, and unfolds its deep pink corollas without yielding a trace of other than pleasant fragrance: and the flowers are very often hexamerous; in this case two of the six segments have the beautiful elongated salmon-colored spot; and these flowers greatly resemble those of the familiar large flowered pelargoniums. I infer,

from the mention of an occasional pink color in the flowers of *R. occidentale* as described, that *R. Sonomense* is not wanting in the herbaria; but I am confident it ought not to be confused with the other.

ERIOGONUM ELEGANS. Related to *E. saratile*, though annual, with the inflorescence of *E. vimineum;* very slender, a span to nearly a foot high, the proper stem simple, only 1 to 3 inches high, very leafy throughout and, like both faces of the leaves, white with a dense floccose tomentum: leaves small, obcordate, broader than long, undulate, tapering to a petiole of 1 inch or less: peduncle slender, repeatedly dichotomous into slender virgate branchlets which are reddish, glabrous and glaucescent: involucres minute ($\frac{1}{2}$ line long), sessile, turbinate, nerveless, rather prominently 5-toothed, glabrous except the woolly-ciliolate margin: perianth roughish-puberulent, rose-red, $\frac{1}{3}$ line long, the segments oblong-obovate, gradually attenuate to the base.

In a sandy bed of the upper Salinas River, Monterey Co., Calif., August, 1891, A. Norton.

SOME NEGLECTED PRIORITIES IN GENERIC NOMENCLATURE.

In an earlier paper I took up a small portion of those genera which Rafinesque had first published, but which most authors had afterwards ignored.[1] I now add others, some of which owe their proposal to other botanists more in public favor than was Rafinesque in his day, and which were displaced in favor of later names with the consent of the authors themselves; a circumstance which, as has often been said,

[1] Pittonia, ii. 120.

does not at all warrant the suppression of them; and they are all sure to come to the front sooner or later.

In most instances I have declined to carry into fields of foreign botany the work of readjusting specific names; but several of the genera are exclusively American.

JACKSONIA.

Rafinesque, Med. Repos. N. Y. v. 352 (1808), not R. Br. in Ait. Hort. Kew. iii. 12 (1811). *Polanisia*, Raf. Journ. de Phys. 98 (1819).

This genus, the most natural of all those which have been taken out of the Linnæan *Cleome*, has never had its best character pointed out. Its capsule is only partially dehiscent, at least in the earliest stage of maturity, and the valves separate from above, the free part becoming recurved to admit of the escape of the seeds. In true Cleome they are wholly deciduous when ripe, but begin their separation from the axis at the base, as in the Cruciferæ. Whether this character holds in respect to the East Indian species of Jacksonia or not, I can not say. Not having seen any of them, and considering that eminent authors have made of them a subgenus, I leave them untouched. There can be no doubt that the American plants were what Rafinesque regarded as the type of JACKSONIA, notwithstanding that he named *Cleome dodecandra* as that type; for he supposed that name to have been given by Linnæus to the common American species; in which supposition he appears to have been in error. I here enumerate only the N. American species.

1. J. TRIFOLIATA, Raf. Med. Repos. N. Y. v. 352 (1808). *Polanisia graveolens*, Raf. Journ. de Phys. 98 (1819). *Polanisia dodecandra*, BSP., Cat. N. Y. 6 (1888), but not *Cleome dodecandra*, Linn.

2. J. UNIGLANDULOSA. *Cleome uniglandulosa*, Cav. Ic. iv. t. 306 (1797). *Polanisia uniglandulosa*, DC. Prodr. i. 242 (1824).

3. J. TRACHYSPERMA. *Polanisia trachysperma*, T. & G. Fl. i. 669 (1840).

4. J. TENUIFOLIA. *Cleome tenuifolia*, Le Conte in herb.. published as *Polanisia tenuifolia*, T. & G. Fl. i. 123 (1838).

KRAUNHIA.

Rafinesque, Med. Repos. N. Y. v. 352 (1808). *Diplonyx*, Raf. Fl. Ludov. 101 (1817). *Thyrsanthus*, Ell. (1818). *Wisteria*, Nutt. (1818). *Wistaria* of recent authors.

1. K. FRUTESCENS, Raf. Med. Repos. l. c. (1808). *Glycine frutescens*, Linn. Sp. Pl. ii. 753 (1753); Pursh, Fl. ii. 474 (1814), under *Apios;* Ell. Sk. ii. 234 (1824), under *Thyrsanthus*. *Diplonyx elegans*, Raf. Fl. Ludov. 101 (1817). *Wisteria speciosa*, Nutt. Gen. ii. 116 (1818): *W. frutescens*, Poir. in Lam. Ill. iii. 674 (1823).

2. K. CHINENSIS. *Wistaria Chinensis*, Sieb. Fl. Jap. i. 90. t. 44 (1835).

3. K. BRACHYBOTRYS. *Wistaria brachybotrys*, Sieb. l. c. 92. t. 45 (1835).

4. K. MEGASPERMA. *Wistaria megasperma*, F. v. M. Fragm. i. 10 (1858).

5. K. AUSTRALIS. *Wistaria australis*, F. v. M.; Lond. Journ. Bot. xxii. 290 (1884).

PSILOSTROPHE.

De Candolle, Prodr. vii. 261 (1838). *Riddellia*, Nutt. Trans. Am. Phil. Soc. vii. 361 (1841), not of Raf. New Fl. n. 756 (1836).

1. P. GNAPHALODES. DC. l. c. (1838). *Riddellia arachnoidea*, Gray, Pl. Fendl. 94 (1849).

2. P. COOPERI. *Riddellia Cooperi*, Gray, Proc. Am. Acad. vii. 358 (1868).

3. P. TAGETINA. *Riddellia tagetina*, Nutt. Trans. Am. Phil. Soc. l. c. (1841).

Var. SPARSIFLORA. *R. tagetina*, var. *sparsiflora*, Gray, Syn. Fl. 318.

AGOSERIS.

Rafinesque, Fl. Ludov. 58 (1817); Journ. de Phys. 100 (1819). *Macrorhynchus*, Less. Syn. Comp. 139 (1832). *Ammogeton*, Schrad. Cat. Sem. Gœtting. 1 (1833). *Cryptopleura & Stylopappus*, Nutt. Trans. Am. Phil. Soc. n. ser. vii. 431 (1841). Species of *Troximon*, Nutt. in Fras. Cat. (1813), & Gen. (1818), not Gærtn.

* *Perennials of western North America.*

1. A GLAUCA. *Troximon glaucum*, Pursh, Fl. ii. 495 & 505 (1814); Nutt. in Fras. Cat. (1813, name only), & Gen. ii. 128 (1818). This, the first acaulescent *Troximon* taken up by Pursh, must be what Rafinesque chose as the type of AGOSERIS. Pursh's second acaulescent species, published in the Supplement, i. e. *T. cuspidatum*, is not congeneric with it. It belongs to my NOTHOCALAIS, Bull. Calif. Acad. ii. 54 (1886).

2. A. PARVIFLORA. *Troximon parviflorum*, Nutt. Trans. Am. Phil. Soc. vii. 434 (1841); Greene, Pitt. ii. 78.

3. A. ROSEA. *Troximon roseum*, Nutt. l. c. (1841). This obscure plant of the "Plains of the Platte" has not been rediscovered; but its existence has not been disproven, nor has its identity with any other species ever been established. or more than vaguely guessed.

4. A. ARIZONICA. *Troximon Arizonicum*, Greene, Pitt. ii. 78 (1890).

5. A. SCORZONERÆFOLIA. *Ammogeton Scorzonerœfolium*, Schrad. Cat. Sem. Gœtt. 1 (1833). *Troximon glaucum*, var. *dasycephalum*, Torr. & Gray, Fl. ii. 490 (1843); *T. pumilum*, Nutt.? This plant is not at all glaucous, and is otherwise distinct as need be from all phases of *A. glauca*. It has an almost woolly involucre and a chaffy receptacle. It is common along the upper Missouri.

6. A. BARBELLULATA. *Troximon barbellulatum*, Greene, in Gray Syn. Fl. 437 (1884).

7. A. ALPESTRIS. *Troximon alpestre*, Gray, Proc. Am. Acad. xix. 70 (1883).

8. A. AURANTIACA. *Troximon aurantiacum*, Hook. Fl. i. 300. t. 104 (1833).

9. A. PURPUREA. *Macrorhynchus purpureus*, Gray. Pl. Fendl. 114 (1849). *Troximon purpureum*, Greene, Pitt. ii. 76 (1890).

10. A. GRACILENTA. *Troximon gracilens*, Gray, Proc. Am. Acad. xix. 71 (1883).

Var. (?) GREENEI. *T. gracilens*, var.? *Greenei*, Gray, l. c.

11. A. ELATA. *Stylopappus elatus*, Nutt. Trans. Am. Phil. Soc. vii. 433 (1841). *Macrorhynchus elatus*, Torr. & Gray, Fl. ii. 492 (1843). *Troximon Nuttallii*, Gray, Proc. Am. Acad. ix. 216 (1874).

12. A. APARGIOIDES. *Troximon apargioides*, Less. Linnæa, vi. 501 (1831); Gray, Syn. Fl. 438.

13. A. HIRSUTA. *Leontodon hirsutum*, Hook. Fl. i. 296 (1833). *Taraxacum hirsutum*, Torr. & Gray, Fl. ii. 494 (1843). *Macrorhynchus humilis*, Benth. Pl. Hartw. 320 (1849): *M. Harfordii*, Kell. Proc. Calif. Acad. v. 47 (1873). *Troximon humile*, Gray, Proc. Am. Acad. xix. 72 (1883).

14. A. GRANDIFLORA. *Stylopappus grandiflorus*, Nutt. Trans. Am. Phil. Soc. vii. 432 (1841). *Macrorhynchus grandiflorus*, Torr. & Gray, Fl. ii. 492 (1843). *Troximon grandiflorum*, Gray, Bot. Calif. in small part.

15 A. MARSHALLII. *Troximon Marshallii*, Greene, Pitt. i. 174 (1888).

16. A. LACINIATA. *Stylopappus laciniatus*, Nutt. l. c. *Macrorhynchus laciniatus*, Torr. & Gray, l. c. *Troximon grandiflorum*, var. *laciniatum*, Gray, Bot. Calif.

17. A. PLEBEIA. *Troximon plebeium*, Greene, Pitt. ii. 79 (1890).

18. A. RETRORSA. *Macrorhynchus retrorsus*, Benth. Pl. Hartw. 320 (1849): *M. angustifolius*, Kell. Proc. Calif. Acad. v. 47 (1873), *teste* A. Gray. *Troximon retrorsum*, Gray, Proc. Am. Acad. ix. 216 (1874).

* * *Annuals of Pacific America, in both hemispheres.*—

Typical MACRORHYNCHUS.

\+ *Chilian species.*

19. A. CHILENSIS. *Macrorhynchus Chilensis*, Less. Syn. 139 (1831).

20. A. LÆVIGATA. *Macrorhynchus lævigatus*, Fisch. & Mey. Ind. Sem. Petr. ii. 41 (1835).

21. A. PŒPPIGII. *Macrorhynchus Pœppigii*, DC. Prodr. vii. 152 (1838).

\+ \+ *Species of Pacific North America.*

22. A. HETEROPHYLLA. *Macrorhynchus heterophyllus* & *Cryptopleura Californica*, Nutt. Trans. Am. Phil. Soc. vii. 430, 431 (1841). *Troximon heterophyllum*, Greene, Bull. Torr. Club. x. 88. Species ranging from S. California to

Vancouver Island and eastward to Utah; running into curious extremes of variability in the character of its achenes; the pappus commonly bright-white, but not rarely sordid. In the var. CRYPTOPLEURA the achene is inflated to the obliteration of almost every trace of the ribs. In var. KYMAPLEURA the ribs are broad, wing-like and beautifully wavy. But in all its vagaries the species is readily known from the next by its small ligules, the expanded head seldom measuring three-quarters of an inch in diameter.

23. A. MAJOR, Jepson, MSS. *Troximon elatum*, Greene. Pitt. i. 71 (1887). This plant is common from Santa Barbara northward through the inner Coast Range and adjacent plains to the head of Sacramento valley. It does not appear to approach the coast northward, or to trespass on the habitat of *A. heterophylla*, and is very distinct. If its achenes should be found to exhibit the same variability as those of that species, I should suspect this to be the original of Nuttall's *Cryptopleura Californica*, which was from Santa Barbara; in which case it would, of course, take that specific name. These are problems which future investigations will have to solve.

SITILIAS.

Rafinesque, New Flora, 85 (1836). *Pyrrhopappus*, DC. Prodr. vii. 144 (1838).

1. S. CAROLINIANA, Raf. l. c. (1836). *Leontodon Carolinianum*, Walt. Carol. 192 (1788). *Scorzonera pinnatifida*, Michx. Fl. ii. 89 (1803). *Chondrilla laevigata*, Pursh. Fl. ii. 497 (1814). *Barkhausia Caroliniana*, Nutt. Gen. ii. 126 (1818); Ell. Sk. ii. 251 (1824). *Pyrrhopappus Carolinianus*, DC. Prodr. vii. 144 (1838); Gray. Syn. Fl. 441.

2. S. MULTICAULIS. *Pyrrhopappus multicaulis*, DC. l. c. (1838).

3. S. PAUCIFLORA. *Chondrilla pauciflora*, Mog & Sesse; Don, Trans. Linn. Soc. xvi. 180 (1836). *Pyrrhopappus pauciflorus*, DC. l. c. (1838).

4. S. SESSEANA. *Chondrilla Sesseana*, Don. l. c. (1836). *Pyrrhopappus Sesseanus*, DC. l. c. (1838).

5. S. ROTHROCKII. *Pyrrhopappus Rothrockii*, Gray, Proc. Am. Acad. xi. 80 (1876); Rothr. Wheeler's Rep. vi. 181. t. 14.

6. S. GRANDIFLORA. *Barkhausia grandiflora*, Nutt. Journ. Philad. Acad. vii. 69 (1834). *Pyrrhopappus scaposus*, DC. Prodr. vii. 144 (1838); *P. grandiflorus*, Nutt. Trans. Am. Phil. Soc. vii. 430.

ADENOSTEGIA.

Bentham; Lindl. Introd. Nat. Syst. ed. 2. 445 (1836); DC. Prodr. x. 537 (1846). *Cordylanthus*, Nutt.; DC. Prodr. x. 597 (1846). *Chloropyron*, Behr. Proc. Calif. Acad. i. 61 (1855).

1. A. RIGIDA, Benth.; Lindl. Introd. Nat. Syst. ed. 2. 445 (1836) & DC. l. c. *Cordylanthus filifolius*, Nutt.; DC. Prodr. x. 597 (1846).

Var. BREVIBRACTEATA (Gray, Syn. Fl. 304, under *C. filifolius*).

2. A. CAPITATA. *Cordylanthus capitatus*, Nutt.; DC. Prodr. x. 597 (1846).

3. A. WRIGHTII. *Cordylanthus Wrightii*, Gray, Bot. Mex. Bound. 120 (1859).

4. A. RAMOSA. *Cordylanthus ramosus*, Nutt. l. c. (1846).

5. A. PILOSA. *Cordylanthus pilosus*, Gray, Proc. Am. Acad. vii. 383 (1868).

Var BOLANDERI (Gray, l. c. under *C. pilosus*).

6. A. TENUIS. *Cordylanthus tenuis*, Gray, l. c.

7. A. Pringlei. *Cordylanthus Pringlei*, Gray, Proc. Am. Acad. xix. 94 (1883).

8. A. Nevinii. *Cordylanthus Nevinii*, Gray, l. c. xvii. 229 (1882).

9. A. laxiflora. *Cordylanthus laxiflorus*, Gray; Bot. Mex. Bound. 120 (1859).

10. A. Orcuttiana. *Cordylanthus Orcuttianus*, Gray, Proc. Am. Acad. xix. 95 (1883).

11. A. mollis. *Cordylanthus mollis*, Gray, l. c. vii. 384 (1868).

12. A. maritima. *Cordylanthus maritimus*, Nutt.; DC. Prodr. x. 598 (1846). *Chloropyron palustre*, Behr. Proc. Calif. Acad. i. 61 (1855).

13. A. canescens. *Cordylanthus canescens*, Gray, Proc. Am. Acad. vii. 383 (1868).

14. A. Parryi. *Cordylanthus Parryi*, Wats. Am. Nat. ix. 346 (1875). *C. canescens*, var. *Parryi*, Gray.

15. A. Kingii. *Cordylanthus Kingii*, Wats. Bot. King, 233. t. 22 (1871).

LAPPULA.

Mœnch, Meth. 416 (1794); F. von Mueller, Cens. 100 (1882); Baillon, Hist. x. 372 (1891). *Echinospermum*, Lehm. Asperif. 113 (1818); DC. Prodr. x. 135 (1846): Benth. & Hook. f. Gen. ii. 850 (1876).

Few Old World species are known to me. The following are of N. America and Mexico.

1. L. myosotis, Mœnch, l. c. 417 (1794). *Myosotis Lappula*, Linn. Sp. i. 131 (1753). *Echinospermum Lappula*, Lehm. l. c. (1818).

2. L. Redowskii. *Myosotis Redowskii*, Hornem. Hort. Hafn. i. 174 (1807). *Echinospermum Redowskii*, Lehm. l. c. (1818).

3. L. Virginiana. *Cynoglossum Virginianum* etc., Pluk. Alm. 126 (1696). *Myosotis Virginiana*, Linn. Sp. Pl. i. 131 (1753): *M. Virginica*, Linn. Sp. ed. 2. 189 (1762). *Echinospermum Virginicum*, Lehm. l. c. *Cynoglossum Morisoni*, DC. Prodr. x. 155 (1846).

4. L. pinetorum. *Echinospermum pinetorum*, Greene: Gray, Proc. Am. Acad. xvii. 224 (1882).

5. L. ursina. *Echinospermum ursinum*, Greene; Gray, l. c.

6. L. floribunda. *Echinospermum floribundum*, Lehm. Pugill. ii. 24 (1830).

7. L. diffusa. *Echinospermum diffusum*, Lehm. l. c.

8. L. nervosa. *Echinospermum nervosum*, Kell. Proc. Calif. Acad. ii. 146. f. 42 (1862): *E. Californicum*, Gray, Proc. Am. Acad. xvii. 225 (1882).

9. L. ciliata. *Cynoglossum ciliatum*, Dougl.; Lehm. l. c. (1830). *Echinospermum ciliatum*, Gray, Am. Acad. l. c.

10. L. hispida. *Echinospermum diffusum*, var. *hispidum*, Gray, l. c. (1882): *E. hispidum*, Gray, Proc. Am. Acad. xx. 259 (1884).

11. L. Mexicanum. *Cynoglossum Mexicanum*, Ch. & Schl. Linnæa, v. 114 (1830). *Echinospermum Mexicanum*, Hemsl. Bot. Centr.-Am. ii. 377 (1882).

12. L. deflexa. *Myosotis deflexa*, Wahl. Act. Holm. 113. t. 4 (1810). *Echinospermum deflexum*, Lehm. Asperif. 93

(1818). Perhaps not of our continent except in the var. AMERICANA. *E. deflexum*, var. *Americanum*, Gray, Proc. Am. Acad. xvii. 224.

ACHROANTHES.

Rafinesque, Med. Repos. N. Y. v. 352 (1808). *Malaxis* § *Microstylis*, Nutt. Gen. ii. 196 (1818). *Microstylis*, Eaton. Man. ed. 3. 115 (1822); Lindl. Bot. Reg. xv. t. 1290 (1829). Not only was Rafinesque the first—he was for a long time the only botanist to declare this a distinctly generic type; for Nuttall made of it no more than a named subgenus of *Malaxis;* and Elliott went no farther. But Amos Eaton who, in 1822, called it a genus *Microstylis*, was the first after Rafinesque to pronounce it positively a genus. Lindley, and a little before him Blume (as *Crepidium*), gave to it that confirmation by virtue of which it has ever since held place among the most unquestioned of orchideous genera. It was unfortunate that Lindley did not go back to the original Rafinesquian and altogether excellent name. Only the following United States and Mexican species are well known to the present writer.

1. A. UNIFOLIA, Raf. Med. Repos. l. c. (1808). *Malaxis unifolia*, Michx. Fl. ii. 157 (1803): *M. ophioglossoides*, Muhl.; Willd. Sp. iv. 90 (1805): Nutt. Gen. ii. 198 (1818): Ell. Sk. ii. 503 (1824). *Microstylis ophiglossoides*, Eaton. Man. 353 (1822); Lindl. Bot. Reg. t. 1290 (1829).

2. A. MONOPHYLLA. *Pseudorchis monophylla*, Clusius, Hist. 269 (1601). *Ophrys monophylla*, Linn. Sp. ii. 947 (1753). *Malaxis monophylla*, Swartz, Act. Holm. 234 (1800). *Microstylis monophylla*, Lindl. l. c. (1829).

3. A. FLORIDANA. *Microstylis Floridana*, Chapm. S. Fl. 454 (1860).

4. A. MONTANA. *Microstylis montana*, Rothr. Bot. Wheeler's Exp. 264 (1878.)

5. A. PURPUREA. *Microstylis purpurea*, Wats. Proc. Am. Acad. xviii. 195 (1883).

6. A. CORYMBOSA. *Microstylis corymbosa*, Wats. l. c.

7. A. UMBELLULATA. *Malaxis umbellulata*, Swartz, Prodr. 119 (1788). *Microstylis umbellulata*, Lindl. Orch. t. 19 (1830).

8. A. MAIANTHEMIFOLIA. *Malaxis maianthemifolia*, Ch. & Schl. Linnæa, vi. 59 (1831); Rchb. f. Linnæa, xxii. 834 (1849), under *Microstylis*.

9. A. OCHREATA. *Microstylis ochreata*, Wats. Proc. Am. Acad. xxii. 453 (1887).

10. A. PRINGLEI. *Microstylis Pringlei*, Wats. l. c. xxiii. 282 (1888).

SPATHYEMA.

Rafinesque, Med. Repos. N. Y. v. 352 (1808). *Ictodes*, Bigel. Med. Bot. i. 43. t. 24 (1817). *Symplocarpus*, Salisb. in Nutt. Gen. i. 105 (1818).

I am unable to find that Salisbury's name for the genus had ever been published, except as a mere name without description or equivalent, before the appearing of Nuttall's Genera. If this be true, *Symplocarpus* is antedated by *Ictodes*. But Rafinesque's name, and its publication with exact equivalent, are unimpeachable as earliest of all, I think.

1. SPATHYEMA FŒTIDA, Raf. l. c. (1808). *Dracontium fœtidum*, Linn. Sp. Pl. ii. 967 (1753). *Pothos fœtida*, Michx. Fl. ii. 186 (1803); Bigel. Med. Bot. l. c. (1817), under *Ictodes;* Nutt. Gen. l. c. (1818), under *Symplocarpus*.

Against the Using of Revertible Generic Names.

There is a rather numerous list of names which, having been applied successively to several different proposed genera, have been, under the law of priority as operating in connection with passing opinions upon the validity of the genera, always slipping about from genus to genus in a fashion most prejudicial to stability in nomenclature. I think that the time is come when botanists should take united action against this insecurity of tenure which invests a considerable number of generic names, including not a few cherished ones. That they are lapsable, and therefore destined to make endless future trouble unless placed under interdict, has come to pass through lack of caution on the part of authors in naming genera. If they had foreseen—and it would not have taken supernatural foresight—that a name once coined and applied to a genus ought to be left to stand or fall with that genus, there would have been no revertible generic names.

For an example of the usage against which I am about to enter emphatic protest, let me refer to page 87 of the tenth volume of De Candolle's Prodromus where, under the bibliography of *Mertensia*, one may gain some notion of the kind of disaster into which plant naming has often been run through making repeated and diverse applications of the same generic name. It will be seen that in the year 1797 Roth published the genus. The reigning autocrats in botany, according to the usual custom of their caste, ignored it, remanding the type to the old genus in which they had been wont to place it. Seven years later Willdenow took up the name and applied it to a supposed new genus of ferns. Three years after that Thunberg, disallowing either the *Mertensia* of Roth or that of Willdenow, proposed a third genus under

that name. In 1817, not one of the three *Mertensias* having met with acceptance, Kunth proposed a fourth; all this repetition of the same name within the space of twenty years. But when the twenty had increased to twenty-five, the tide began to turn. Several keen-eyed botanists of a new generation began to see for themselves, in the peculiar habit and aspect of those graceful soft blue-green "Pulmonarias" a good generic type. The oldest *Mertensia* was either forgotten, or believed to be too long dead and buried to be worth the attempt to revive it. Hartmann in 1820 gave the genus a new name, *Hippoglossum.* Dumortier in 1823 called it a new genus *Casselia.* Reichenbach in 1830 created another synonym for it in his *Steenhammera.* Meanwhile the least popular, but one of the most acute and learned, as well as among the most original of all British botanists in any age, S. F. Gray, had both recognized the validity of the genus and reapplied its rightful name, *Mertensia,* in 1821. So, within thirty-three years—the space of a single generation, as history may be reckoned—a desirable generic name is applied to four different genera, and the genus to which it was first applied acquires four different names.

I have cited this case, merely because it is an easily accessible one to any who may wish to look into the subject for himself; not because it is at all a complicated or particularly vexatious instance of its kind; for, unhappily, it is not. There are several instances in which a name has been more often repeated, involving alteration in the names of a greater number of species; indeed, this practice of applying the same name successively to from three to half a dozen genera, has been the most prolific of all the causes of that which botanists everywhere declaim against—the incessant change of names. I have wondered that leading botanists did not, long ago cease giving countenance to the usage in question; for several of them must have observed how inimical it is to all stability in nomenclature. I know it may be said that desirable generic names, particularly such as commemorate distinguished men, are sometimes applied in the first instance,

where there is little promise of a permanent genus; and that to preclude a second or a third, or if need be even a seventh application of a cherished name is hard when the name is a favorite one. But there is no argument at all in this. Upon precisely these grounds have the repetitions been made; and the successive dropping into synonomy of one and another of the endeared names has always followed; and unceasing change, and total insecurity to each such name except where first applied, are among the consequences of this liberty of reapplication. There is but one way out of these entanglements, and that is, to reserve every name for the genus to which it was first given, or let it pass from thence only into synonymy; a place whence it may be recalled if perchance it be needed, without entailing change in the names of from one to four or five other genera. This contingency should always be provided for. Perhaps no genus was ever proposed upon characters so unsatisfactory but that some one else, perhaps in the seat of "authority" may discover characters demanding its reinstatement long after it may have been deposed. This thing is all the while happening; and change and confusion respecting the names of a hundred genera and the species involved are sure to be the order of the day so long as revertible names are not studiously avoided—everywhere ignored.

Our allies, the zoologists, came to this point some time since. The sooner systematic botanists agree upon the principle of "once a synonym, always a synonym," the earlier will botanical nomenclature begin to be found a settled thing.

For my part, I have long since seen the necessity of a movement in this direction. I have urged it in private correspondence with several of my colleagues; then again, I have shrunk from taking a step which, as I am well aware, will involve the dropping into synonymy of many a familiar and long cherished generic name. But I am now assured others see the need of this reform, and will aid in its prosecution. Nothing along these lines is gained by delay. Simple priority alone is making large, but unavoidable

alterations in our nomenclature. Those which are called for under the present heading are better made *pari passu;* thus the duration of the inevitable period of change will be shortened. The bulk of these unfortunate names have been derived, as above intimated, from the names of eminent individuals. There is every temptation to try to keep these in use; therefore they are the most frequently repeated, and become the most troublesome of all. Those not accustomed to these things may be surprised at the number of different uses which have been made of *Bigelovia, Torreya, Nuttallia,* etc.

It is my purpose for the future to reject every name of this kind, except as connected with the first type to which it was applied; thus allowing to no genus with which I may have to deal, a revertible name—one which may by any possibility be claimed for an earlier genus. The following are but a few out of many changes which this rule will demand.

XYLOTHERMIA.

Pickeringia, Nutt. in Torr. & Gray, Fl. i. 388 (1840), not of Journ. Philad. Acad. vii. 95 (1834).

Nuttall's earlier *Pickeringia* is of the Myrsinaceæ and was first published by him as a new species of *Cyrilla.* After having proposed it as a new genus, it was remanded by him to the genus *Ardisia.* But, as the type of a genus, *Pickeringia*, it had the approval of a botanist as eminent as the elder De Candolle; while the second great botanist of that name, in referring it to *Ardisia*, made of it a subgenus *Pickeringia.* And even Bentham, at a much later date, and after the shrub had become much better known, pays some deference to the rank allowed it by A. De Candolle. It would not be at all surprising if the next monographer of *Ardisia* and its allies should restore it to generic rank, in which case it could take no other name but *Pickeringia.* The Californian shrub, belonging to the Leguminosæ, I shall call

XYLOTHERMIA MONTANA. *Pickeringia montana*, Nutt.; Torr. & Gray, l. c.

OSMARONIA.

Nuttallia, Torr. & Gray, in Hook. & Arn. Bot. Beech. 336. t. 12, and Fl. N. Am. i. 412 (1840), not of Barton (1823), nor of De Candolle (1821), nor of Rafinesque (1818).

I am unable to quote definitely any more than the four different applications of this name hinted at above. But a fifth use of *Nuttallia* I find a trace of in Sprengel's Systema, who credits it to Nees von Esenbeck, as having been founded on a species of *Trigonia*, Aubl. The date of this homonym must be 1826 or earlier.

De Candolle's *Nuttallia*, which Rafinesque's *Nemopanthes* antedates by four years, is monotypical, well known, and therefore not liable to rise up against the *Nuttallia* which has been everywhere in recent years accepted.

The case of the fine malvaceous *Nuttallia* of Barton is somewhat complicated. During ten or twelve years immediately succeeding its publication, it seems to have met with acceptance everywhere. Various species, under this name, were described and beautifully figured in such popular serial publications as Sweet's British Flower Garden, the Botanical Magazine, the Botanical Register, and Paxton's Magazine. In 1834 Nuttall, confident of the stability of the genus and of the permanency of the connection of his own name with it, transferred thereto the *Malva Munroana* of Douglas and added the name and specific character of a new *Nuttallia cordifolia*.[1] Not long after this Sir William Hooker, without actually deposing the genus, suggested that the species might perhaps be distributable between *Malva* and *Sida*;[2] and in 1838 Asa Gray, then young, with little experience, and with aggressiveness according to his years, reduced all the species to *Malva*;[3] not failing to create, in the same volume a new *Nuttallia* of his own. But his

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1. Journ. Philad. Acad. vii. 98.
2. Journ. Bot. i. 196.
3. Torr. & Gray, Fl. i. 226 & 227.

suppression of the other one did not meet with the expected approval, and ten years afterwards he saw for himself that it must needs be restored. At this juncture, to save the latest *Nuttallia*—that of his own making and naming—intact as to the name he had given it, he seems to find an earlier name in the *Callirhoë* of Nuttall, for the *Nuttallia* of Barton. I am very apprehensive that he erred as to the date of the publication of the genus *Callirhoë*. I suspect that he followed a usage not uncommon at that time, of reckoning the date of the reading of a paper at an academic meeting as the date of publication. Nuttall's *Callirhoë* was read in March, 1822; but this, while a year earlier than the publication of Barton's *Nuttallia*, is not a date of publication; and just what may be the date of the second volume of the Philadelphia Academy Journal, looks very uncertain. The volume bears on its title page—what must be very wide of the truth—1821, the date when the first, not the last of its articles was read in the Academy. The volume was reviewed as new, in Linnæa as late as 1828; and its actual publication may perhaps be found to have taken place several years later than 1823, the year in which Barton's *Nuttallia* appeared. I have little or no doubt that a careful and thorough search into the date of publication of *Callirhoë* will prove it to be later than Barton's *Nuttallia*. The continued use of the latter name for the malvaceous genus, by Hooker, Lindley and even Nuttall himself is of itself a circumstance indicating strongly its probable priority over *Callirhoë;* and *Nuttallia* will probably revert from the drupaceous, as far as to the malvaceous, genus, if no farther.

But the trouble with *Nuttallia* is far from ending here. The loasaceous *Bartonia*, long supported by the best authorities and everywhere accepted for many years, was at length found incapable of retaining its name. It reverted, by priority, to that gentianaceous genus of Muhlenberg which has since claimed it without dispute. Rafinesque discovered this fact, insisted upon the restoration of that earliest name in place of *Centaurella*, Michx. He then according to the

needs of the case renamed the second *Bartonia*, calling it *Nuttallia*. This is the first use ever made of the name, and the full equivalent is stated.

On the reverting of the first *Bartonia* from this genus, the species were made a section of *Mentzelia;* and so Rafinesque's *Nuttallia* was evaded. I have long been familiar with these far-western plants. They bear no closer relation to the type of *Mentzelia* than do the species of *Eucnide*. The last is recognized as a genus by all American botanists except myself. The *Bartonia* section will sooner or later resume generic rank and title under some one's critical inspection; and the only generic name it can then take will be *Nuttallia*.

In view of all these contingencies I shall henceforward write

OSMARONIA CERASIFORMIS instead of *Nuttallia cerasiformis*, Torr. & Gray.

CHRYSAMPHORA.

Darlingtonia, Torrey, Smithson. Contrib. vi. 4. t. 1 (1853). not of De Candolle (1825).

De Candolle's original *Darlingtonia*, based on plants which had been at first placed under *Acacia* and *Mimosa*, stood approved by Meisner, Torrey & Gray, Endlicher and many more of the ablest critics of genera; but Bentham regarded the plants as species of *Desmanthus;* and perhaps a majority of botanists of to-day would agree to that. Still the tenure of this name for our Californian sarraceniaceous herb is rendered too precarious. It may fail us any day, upon the discovery of additional characters in the Candollean genus, or upon any reassertion whatsoever of its generic rank.

1. CHRYSAMPHORA CALIFORNICA. *Darlingtonia Californica*, Torr. l. c.

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[1] Raf. Am. M. Mag. ii. 226 (Feb. 1818).

LILÆOPSIS.

Crantzia, Nutt. Gen. i. 177 (1818), not of Schreber (1789), nor of Swartz (1788), nor of Scopoli (1777).

Nuttall in proposing *Crantzia* as a name for this genus of the Umbelliferæ makes no mention of any other earlier employment of the name than that of Vahl and Swartz. There had been as many as three or four other applications of it before Nuttall's time; and the earliest of all is that of Scopoli, who so named a Gesneriaceous genus which is more or less frequently accepted as a good one; and Rafinesque, as late as 1838, proposed for it a new name, *Lophalix*,[1] which was not called for, except upon the supposition that the very latest *Crantzia*, that of Nuttall, might be stubbornly retained in spite of the fact of its being a "dead" name. Our plant bears a close likeness to the genus Lilæa.

LILÆOPSIS LINEATA. *Hydrocotyle lineata*, Mich. Fl. i. 162 (1803). *Crantzia lineata*, Nutt. Gen. l. c.

NEMOSERIS.

Rafinesquia, Nuttall, Trans. Am. Phil. Soc. vii. 429 (1841). not of Rafinesque (1838, and earlier).

The genus which Rafinesque, in the Sylva Telluriana, dedicated to himself, has for its type the *Bignonia carulea* of Linnæus, a plant separated from *Bignonia* even by Jussieu, and placed by him in *Jacaranda*. What disposal may have been made of it by recent writers upon the Bignoniaceæ I know not. I am equally ignorant as to what may have been the type of the still earlier *Rafinesquia*, Raf., nor do I know when or where it was published. Our West American herbs known hitherto under this duplicate and reduplicate name, were placed in Rafinesque's *Ptiloria* (*Stephanomeria*, Nutt.) by Bentham & Hooker, and I was at first disposed to think

1. Sylva Telluriana. 70.

well of this; but the observations of recent years have fully satisfied me that it is a good genus, though it has a very close ally in *Calycoseris*, Gray.

1. N. CALIFORNICA. *Rafinesquia Californica*, Nutt. Am. Phil. Soc. l. c.; Gray, Syn. Fl. 415.

2. N. NEO-MEXICANA. *Rafinesquia Neo-Mexicana*, Gray, Pl. Wright. ii. 103 (1853), Greene, Pitt. i. 291.

TUMION.

Rafinesque, Amenities of Nature, 63 (1840). *Torreya*, Arnott; Ann. Nat. Hist. i. 126 (1838), not of Eaton (1833), nor of Sprengel (1821), nor of Rafinesque (1817 & 1818). *Caryotaxus*, Zucc.; Henk. & Hochst. Nadelh. 365 (1865). *Fœtataxus* Nelson (as Senilis), Pinaceæ, 167 (1866).

The following, from the pen of the late Dr. Gray, is as graceful a verbal tribute as has been paid to the memory of any American botanist: "All round the world, *Torreya taxifolia*, *Torreya Californica*, *Torreya nucifera* and *Torreya grandis*—as well as his own important contributions to botany, of which they are a memorial—should keep our associate's memory as green as their own perpetual verdure."[1]

The generic name *Torreya* for now more than fifty years has been applied continuously to a beautiful genus of taxaceous trees; and at this moment it is an unwelcome task to point out as inadmissable this use of the name. But it is perfectly clear, and should have been so to every author who has been concerned, that this genus never for a moment had any just claim to the name. Waiving, therefore, all consideration of the final revertibility of the appellation *Torreya*, and granting its availability for the earliest unquestioned genus to which it was applied, that genus is Nuttall's *Synandra*, over which Rafinesque's second *Torreya* holds something near a year's priority. It is therefore incontro-

[1] A. Gray, Proc. Am. Acad. ix. 271.

vertible that it must now go back, at least as far as to the labiate genus, to the displacement of the name *Synandra*. It is also somewhat unfortunate that Dr. Gray, in the place to which I refer, should have given so very incomplete a history of the employment of this desirable name, and that he should have been wrong in every point which he essayed to make concerning such history. He mentions only three out of the five attempted uses of the name, states Sprengel's to have been the first, whereas it was the third; and places only a "second" to the credit—or discredit—of Rafinesque, while Rafinesque proposed both the first and second of the various Torreyas which are on published record. Half a century has now elapsed since this author published his full, accurate and plain account of the "Five Genera TORREYA,"[1] and there is now no evading his conclusions. Meanwhile his *Tumion*, which must needs be taken up as earliest, has been furnished with two synonyms; *Caryotaxus*, so admirable as to be almost longed for in its retirement, and *Fatotaxus*, so barbarous an appellation that priority, if it had possessed that claim, could scarcely have saved it. We are told that TUMION is "a Grecian name of Dioscorides for the *Taxus*."

1. T. NUCIFERUM. *Taxus nucifera*, Kæmpf. Amœn. Exot. 814 (1712); Thunb. Fl. Jap. 275 (1784). *Podocarpus? nucifer*, Pers. Syn. ii. 633 (1807). *Torreya nucifera*, Sieb. & Zucc. Fl. Jap. ii. 64. t. 129 (1842). *Caryotaxus nucifera*. Sieb.; Endl. Syn. Conif. 241 (1847). Native of the mountains of Japan.

2. T. GRANDE. *Torreya grandis*, Fortune; Gord. Pinet. 326 (1858). *Caryotaxus grandis*, Henk. & Hochst. Nadelh. 367 (1865). Inhabits the mountains of Northern China.

3. T. TAXIFOLIUM. *Torreya taxifolia*, Arn.; Ann. Nat. Hist. i. 130 (1838). *Caryotaxus taxifolia*, Henk. & Hochst. l. c. Native of Florida.

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1. Amenities of Nature, 63.

4. T. Californicum. *Torreya Californica*, Torr. N. Y. Journ. Pharm. iii. 49 (1853); J. M. Bigel. in Pac. R. Rep. iv. 24 (1857): *T. Myristica*, Hook. Bot. Mag. t. 4780 (1854). *Caryotaxus Myristica*, Henk. & Hochst. l. c. Californian, in the Coast Range and Sierra Nevada.

On the Citing of Ancient Botanical Authors.

In respect to certain readings in my Flora Franciscana, I am criticised somewhat as if I were an innovator: though without having therein taken an inch of ground peculiar to myself; without having entered upon course of procedure which has not been taken by learned and famous botanists at one time and another within the past century.

The strictures upon my citation of ancient authors are not as keenly edged as I anticipated they might be, and seem to me to owe what efficiency they have as much to wit as to wisdom, if not more. To my friend Dr. Britton I am under obligations, however, for the freedom, the fullness and the seriousness of his criticism: and, since he seems to have covered well all the debatable ground, I shall here reproduce the main portions of it, for the convenience of the reader, who may thus be able to judge whether or not the objections are refuted. Speaking of my pages, Dr. Britton says:

"Generic names used by pre-Linnæan authors and adopted by Linnæus are credited to the old writers even as far back as Dioscorides and Pliny."[1] This is an unfortunate statement with which to have opened the criticism of a point, seeing it is not at all true except under very decided and important limitations. The first generic name taken up in my book, *Cercis*, is of the ancients, was adopted by Linnæus, and is by me credited to Linnæus, not to any ancient author.

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1. Bull. Torr. Club, xviii. 159.

and this because the most eminent critics of ancient botany failed to identify *Kerkis;* so, while the name is as old as any, Linnæus alone can with certainty be accredited as the author of it in its current application. There is, indeed, a pre-Linnæan name which is applicable to it with certainty, *Siliquastrum* of Castor Durantes (1585). This learned Roman botanist, convinced that this type could not be identified with any genus of the ancients, gave it the name *Siliquastrum*—one which I have little doubt will be taken up as the lawful one some day instead of *Cercis.* But, it is impossible to turn many pages of my book without meeting fresh instances of ancient names credited to modern authors for the same reason. *Lotus* is credited to Tournefort because the ancients had several Loti, and Tournefort is responsible for the modern application of the name. *Melilotus* is another in the same category, credited to Morison for a like reason. But there is no question that the *Glycyrrhiza* of Dioscorides and of the Flora Franciscana are generically identical; in a word, I have written the names of classical writers only after such of their genera as have been conceded to them by a consensus of the critics who have dealt with that subject.

But Dr. Britton continues:

"The ancients did not use the names in the generic sense of Tournefort, Linnæus and others of about their time, but in most cases, at least, as mere appellations for plants."

I grant the impossibility that the ancients should have applied names in the generic sense of any generation of modern botanists; because no two or three leading botanists of any age have yet been found with a generic sense in common. The Tournefortian sense of genera and the Linnæan are at opposite extremes. A single genus of Linnæus will contain from two to a half-dozen genera of Tournefort or of the average nineteenth century botanist. But perhaps I do not clearly apprehend my friendly critic's meaning. Did he wish to say that the ancients had no sense of genera, and did never apply their names as generic? I am not willing to entertain a suspicion even, that such a view could be held.

the contrary fact is so manifest; yet how else shall one interpret the rather vague statement that the ancients used their names "as mere appellations for plants?" The expression is at best not a forcible one to have introduced into an argument. I do not see that the best new generic name coined by Tournefort in his day, or any or all of the specific binomials either adopted or proposed by Linnæus, are anything more than "mere appellations for plants."

For one instance out of many which might be selected to illustrate a similarity between ancient and modern conceptions of genera, take the familiar name *Nymphæa* and its various applications. Dioscorides had two kinds, or species, in his *Nymphæa;* one was our *Castalia alba*, the other our *Nymphæa lutea*. The Tournefortian genus of the same name is just the same thing, though embracing four species inclusive of the two known to the ancients; while the *Nymphæa* of Linnæus is more complex than that of the other two, for it includes *Nelumbo*, a type so diverse from the others that neither Tournefort nor Dioscorides ever named it as a kind of *Nymphæa*. Both allowed it to stand apart under a (generic) name of its own. So the worst misuse to which the name in question was ever subjected, as a vague appellation for heterogeneous plants, was that which it received at the hands of Linnæus.

Without doubt the ancients sometimes brought together under one generic name more incongruities than are embraced in the most complex of Linnæan genera. It is incontestable that for some centuries past we have been making progress in the art, still very imperfect, of detecting the real affinities of plants; and so we have been all the while approaching the true idea of a genus; nevertheless, there is not in my opinion any such difference in kind between the genera of ancient and those of modern authors as can affect the justice, the literary propriety, or the historic accuracy of citing the ancients as authors of genera wherever their plants—their generic types—are identifiable by their writings. A hundred years ago a celebrated English botanical scholar allowed that

of the seven hundred plants in the Materia Medica of Dioscorides, about four hundred had been properly identified.[1] But the means of ascertaining them had not then been exhausted: the ancient plant-descriptions and the numerous commentaries on them, and also the then not well explored living fields of classic Grecian and Latin botany, all have been made the subjects of renewed and fruitful investigation even within the present century. My friend errs in assuming—and he must have assumed it altogether, and without having looked at the authors named—that the ancients did not describe things or attempt to do so, but that "they merely recorded what certain plants were called in their time." Mere records of plant-names could never have earned for the writers of them the title of "Fathers of Botany," as Theophrastus, Dioscorides and Pliny have always been called.[2] Nor is it very accurate to say that "Some of these terms must be as old as spoken language," nor very pertinent to the subject to conclude that "probably a number of them exist on the monuments of ancient Egypt." Egyptian monuments, with their possible names and even figures of plants—all anonymous as to authorship, if any kind of authorship or publication can be ascribed to them--are far from susceptible of being brought into parallel with books of certified authorship containing names and descriptions, and which have been copied and circulated for the instruction of men for some two thousand years. And as to the antiquity of the names themselves, few if any are likely to be older than the Latin and Greek languages in whose vocabularies they are found; and neither of these tongues is the earliest, or any where near the earliest, spoken language.

Against the statement that the Greek fathers of botany "surely did not originate such names as *Astragalus* and *Sorbus*," I can not successfully contend. I am inexcusable for having written Theophrastus as author of *Sorbus*. It

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1. Pulteney, Hist. Sk. Bot. i. 39.
2. Ibid. 34, 35.

belongs to Pliny. The Greek name of these trees is a very different one.[1] But *Astragalus* is merely classic Greek, its application as a plant-name was adopted by *Dioscorides*. if not originally made by him. The *Astragalus* of Linnæus certainly includes the *Astragali* (and also the *Tragacanthi*) of the Greek botanists of old; and, as applied to this particular type of leguminous plants, has come down to us in unbroken succession—has been employed by all authors, ancient, mediæval and modern—through all the ages of plant history.

In substantiation of my statement that, in the usage in question, I am not an innovator, I refer to the writings of the following post-Linnæan botanists: Scopoli, Sprengel, S. F. Gray. And none of these appear to have made unwarranted applications. They cite Dioscorides and Pliny, as I do, only where the types are ascertainable by the ancient descriptions. I consider that simple truthfulness requires this to be done: but one thing I concede freely; to make Linnæus the author not only of the few genera which he offered as new, but of those founded by all the generations of botanical authors who preceded him, is an easy course to pursue; though every principle of literary justice and truthfulness and of historic accuracy is sacrificed along that easy course.

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1. Nevertheless, Sibthorp tells us that *Sourmpia* and even *Sourbia* are modern Greek names for the trees or their fruits.

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VI.

Josephi Pitton Tournefort, * * * *Institutiones Rei Herbariæ.* Edito altera * * Parisiis, 1700.

Viewed impartially, with a mind as far as possible free from that bias which naturally warps the judgment in favor of things done nearer our own times, this book, now nearly two centuries old, will appear as the most conspicuous landmark in the history of Systematic Botany. To Tournefort has been conceded always not only the honors due a most luminous advocate of the Natural System of classification; he has been styled the scientific founder of genera. The last claim—and it is the most significant one ever made in favor of any botanist—is based upon this, that his is the first elaborate and universal treatise on the genera and species of plants in which the genera are determined, in the main, according to certain fixed principles of organography; the application of those principles being limited or modified only in deference to matters of habit and sensible properties in the plants. The credit of having originally enunciated these more scientific principles of classification Tournefort is far from arrogating to himself. He attributes them to their actual discoverer, Fabius Columna, a Roman botanist of a century earlier.[1] Conrad Gesner, a contemporary of Columna,

1. The following may pass for a not unfaithful free rendering of Columna's modest statement of his principles: "In the constituting of genera I have not made much of the form of the leaves; for I judge the affinities of plants to be indicated not by the leaves, but by the flower, the seed-vessel, and above all by the seeds themselves; especial attention being given to any agreement among plants in respect to flavor." See Tourn. Inst. i. 53.

though older and a little earlier in the field of authorship, had set forth, though less distinctly, almost the same doctrine; and Tournefort states unreservedly that: "The establishing of genera upon a legitimate basis is to be attributed to Gesner and Columna."[1] But neither of these had very extensively applied the principles; and Tournefort's great contribution to the advancement of botany lay in the consummate learning and skill with which he applied them to the whole realm of botany as then known.

In systematic botany the conception of the genus is fundamental. To get as near the truth as possible in respect to what constitutes a genus is a prime necessity of the science; and Cæsalpinus, another contemporary of Gesner, the first of all men to predict that in the fruit of plants would be found the key to their real affinities, is author of the celebrated remark, that "The confounding of genera confuses everything."

The botanists of antiquity, and also their disciples and commentators down to about the close of the sixteenth century, co-ordinated plants largely according to qualities and uses. Then, when calling organography to their aid, they naturally enough took into consideration just those organs by which plants make their first and deepest impression upon the mind; the leaves, stems, roots, etc. They constructed their genera—or gave a common name to an assemblage of species, which is the same thing—according to the form, texture, and duration of leaves, stems, roots; according to the presence or absence of prickles, spines or thorns, or the nature of the pubescence, not by any means ignoring but rather making much of the external characteristics of the fruit. Their genera were, in a word, those of the beginner self-taught. They were often extremely crude and heterogeneous; but they were also in many an instance as natural and as perfect genera as those of the most enlightened and skillful of modern botanists. Such genera as they conceived exist in the minds, and find expression in the common speech of unlettered people, savage or civilized, in every country to-day.

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[1] Inst. l. c.

The English name, *Thistle*, essentially generic, embraces as used a great variety of plants belonging to several more or less technically formulated genera of the botanists, in a number of natural orders. First it takes in many more or less heterogeneous cynaroid composites, then a number of cichoriaceous plants, and more unfortunately, certain poppies. What botanist of experience is not familiar with the name of *Thistle* as applied by the unskilled to the species of *Argemone?* The vernacular term as popularly employed will embrace almost all herbaceous plants which arm themselves against our approach by a sharply spinescent foliage. It is an extreme case of primitive crudeness in the delimitation of a genus; of a mistaken generalizing upon a marked peculiarity of foliage. And yet it must be allowed that this very case of the *Thistles* is one which has given to the "scientific" genus-makers one of the most difficult of problems—a problem actually no nearer its successful solution, we think, than it was two centuries ago as Tournefort left it. For granting that by our botanical science we readily exclude from the alliance of *Thistles* all such incongruities as *Sonchus* and *Argemone*, when it comes to the cynaroids themselves, we wish to have several genera—believe that we ought to have them, think that in nature they do exist—and are obliged to fall back upon the methods of remote antiquity and make our appeal to vegetative characters, such as foliage, and the presence or absence of spines, in order to avoid merging a whole suborder of plants in one genus. Tournefort gave his support to the eight genera following: *Carduus*, *Cinara*, *Jacea*, *Cyanus*, *Centaurium*, *Cirsium*, *Lappa* and *Cnicus*. Linnæus, by reducing *Jacea*, *Cyanus* and *Centaurium* to one (i. e. *Centaurea*), brought the number down to six; but a reaction came, as more species were brought to light, so that the Linnæan *Centaurea*, as augmented by these many new species, within less than a hundred years from the time of Linnæus, had been subdivided by various authors into more than thirty genera.[1] Now whether, with Tournefort

[1] See Benth. & Hook. f. Gen. ii. 478—482.

of two centuries since, and with M. Baillon of to-day, we admit six or eight genera of these thistly herbs, or whether with Cassini, S. F. Gray and their class of specialists we allow thirty or forty, it remains true that our genus-making is here almost entirely regulated by the value we place upon the character of leaves or the simplest of all leaf-modifications, the bracts of an involucre. Whether we speak of *Carduus* or *Cnicus*, *Centaurea* or *Cirsium*, the foundations of the "scientific botanist's" genus are the same which the ancient fathers of botany are said to have built upon, and are at the same time those which the intelligent farmer or woodsman and even the untutored Indian generalize upon very successfully to-day. Nor are the conclusions reached on either hand of a nature to warrant any boasting on the part of the botanist's technical knowledge over the plain plowman's common sense. Either the *Carduus* or *Centaurea* of the former is—to take an average of the varying opinions of professional botanists—a less definitely settled and not much less diversified genus than the *Thistle* of the latter.

Thus much in illustration of certain crudities in method, and diversities of result, incident alike to the earlier and to the later attempts to classify plants. But cases of entire though unconscious agreement between the unlearned and the learned, as to the limits of a genus, are perhaps very numerous. Let me assume that an intelligent farmer is familiar with several sorts of field and pasture clover, and also with two or three kinds of what are called sweet-clovers; of the latter say a white-flowered and a yellow-flowered species. If I speak to such a one of *Sweet-Clover* in general, I recall to his mind a generic conception as perfect, though not as extended, as I should awaken in the mind of the director of a botanical garden by the mention of *Melilotus*. If to the former I should but name *Clover*, it would be all the same as if I spoke to a botanist about *Trifolium*. The American farmer's *Clover* is as exact a generic name with him as the *Trifolium* of those instructed in botany is to them. True it might be that if the rustic knew but a single kind of

sweet-clover, he might fail to make the unconscious generic distinction which I justly credit him with having made under the assumed condition of familiarity with several kinds; but even if he confuse the genera and make his sweet-clover a mere species of *Clover*, Linnæus did the same.

In our northerly latitudes—the region of the birches—I believe that the uneducated have as correct and as definite a conception of the respective limits of *Betula* and *Alnus* as the botanists have. They can tell a *Birch* from an *Alder* anywhere; they recognized the several species of the former, and assigned them their English specific names so long before the era of our botanical nomenclature that Linnæus, translating those vernacular specific appellations into Latin, adopted them for scientific use.[1] And quite such has been the origin of a vast number of our scientific names of trees and useful or highly curious plants. Now it may be that the woodsman when asked how he distinguishes between an *Alder* and a *Birch*, gives answer that the former grow along the margins of brooks, the latter on high and dry ground; which will be putting habitat in the place of a generic character: or he may name as distinctive the diverse properties of each, and the uses for which they are available, and this is establishing a genus upon sensible qualities. The drawing of such distinctions, where they could perceive no better ones, exposed the primitive botanists to the criticism that they were "unscientific." But the truth seems to be that genera are more easily recognized than defined; and this holds with respect to botanist as well as woodsman; though the former has invented a technology and a terminology by the help of which he is able to frame definitions, and usually to draw limitations, which are more satisfactory. But still it remains that, while many genera are so natural that the illiterate recognize and name them, after a fashion of their own, others are confused by twos and threes and half-dozens by the professional botanist because he fails to find what his "science" calls for, a technical character for each.

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[1] But he confounded the birches and alders as one genus!

The scientific basis of genera, if it exist, is yet to be discovered. There is no rule—there is no set of rules—by which plant-genera may be determined. If ever such a set of rules, founded in nature, and correctly formulated, shall be drawn up, then will systematic botanists be brought to agreement respecting the limits of every genus.[1] The dawn of such a happy era may be near or remote, or it may never come at all; meanwhile it would be advantageous to botany if, retaining all which has been accumulated in the line of actual knowledge, we could divest it of certain trammels of empiricism and pedantry with which it has for many generations been more or less seriously affected. It surely is not scientific, but rather empirical, to found genera, after the Linnæan method, absolutely upon flower and fruit irrespective of habit and qualities. And, as in every branch of knowledge there inheres a tendency to the pedantic, strong in about the ratio of its inexactness as a science, so is modern systematic botany grown rather too self-conscious and too self-assertive of its claims; for, while the primitive idea was this artistic rather than scientific one, that a genus is so natural as to be recognizable by a general impression made, and without the aid of any precise organographic description, that has been forced to give place to an opposite conception perhaps as far from the truth, that a family of plants is not a family, nor a genus a genus, independent of a Latin name and a set of botanical phrases descriptive of the flower and fruit; from which standpoint it is held that genera have neither history nor names anterior to certain authors, and that the Fathers of Botany were not botanists.

These strictures, I am glad to admit, have their most exact application to the botany of one or two generations ago. The abandonment of the Linnæan and wholly empirical

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[1] We evade all this now by denying that either species or genera or orders exist in nature. It were as reasonable to try banish from the minds of men the ideas of a vegetable kingdom and an animal kingdom; for we can no more set perfect organographic boundaries to these than we can to genera and species.

classes and orders, in favor of the Jussiæan, though a significant movement was not a radical one, for it left the Linnæan empiricism respecting genera quite undisturbed; and the genus, according to my understanding, is the fundamental thing in systematic botany. But I read, on many a recent page, plain evidence that some botanists of to-day are receding from the Linnæan to the Tournefortian method of recognizing and defining a genus. The botanical *zeit geist* is leading in that direction. Some are following it unconsciously; others I am certain—and among them some very eminent men—have been more or less carefully pondering, as if it were a new volume, the old Institutiones Rei Herbariæ. This, as I said at the outset, is the earliest universal treatise in which the genera of plants are determined in the main by characters of flower and fruit. The generic characters, if divested of certain phrases perpetually reiterated, are extremely brief; for seldom is any notice taken of other organs over and above the calyx, corolla, pistil and fruit. But since I write these paragraphs not for the learned, to whom nothing contained herein is new, but for the learner, and for a number of readers who have not access to the volumes of the Institutiones, I shall give an example of that set form of words in which the definition of each genus is cast, turning the Latin into English.

"CARDAMINE is a genus of plants with flowers *cruciform*, that is to say, consisting of *four petals:* from whose calyx arises a pistil which afterwards becomes transformed into a *two-celled silique having a partition in the middle to which adhere two valves*, the cells containing seeds which are *mostly orbicular*. To these characteristics it should be added that the valves when mature roll into a coil and eject the seeds with force."

I have put in italics what the author held as technical in the definition of this genus. Invariably this part is run into a single sentence or period. Such words and phrases as are here given in Roman character, are continually repeated, and form a part of the description of each genus. The second

and concluding period is not a part of the "scientific" character, but answers to that supplementary note which, in the formulary of more recent authors, is set off from the technical description by a dash after the period, to which place are relegated all matters appertaining to habit and the vegetative organs.

The next genus after *Cardamine*, with our author, is *Dentaria*. The generic character is the same, except that in reference to the form of the seed *rotundatis* takes the place of *orbiculatis;* but in the subjoined note comes out the real distinction which is drawn between *Cardamine* and *Dentaria*, the fleshy and scaly or notched rhizomes of the latter. In this instance, the new principle, that genera are to be determined by flower and fruit only, fails to give the desired result; and again and again it fails. Next after *Dentaria* follows *Sisymbrium* (the *Nasturtium* of more recent botanists); and the only alteration in the generic character is that of the substitution of *subrotundis* for *rotundatis* in the description of the seeds. But the real mark of the genus comes out only in the superadded note: "a certain general aspect peculiar to the species of this genus;" though at the end of the catalogue of species he states, very aptly, this negative generic character. "*Sisymbrium* differs from *Cardamine* in that the valves of its silique are not elastic;" but adds that "from *Leucoium* (our *Cheiranthus*), *Brassica* and some others, it is to be distinguished by habit only." To *Eruca*, the next in order, is ascribed precisely the generic character of *Sisymbrium*, while the real mark of the genus, as indicated at the end is, "the peculiar flavor."

But these are genera of Cruciferæ, an order in which all the plants are so closely related one to another that it becomes more than usually difficult to set boundaries to genera. Nevertheless, Tournefort everywhere, in all families of plants and even in the classifying of trees, gives recognition to natural genera, whether he finds an organographic character or fails to find it. *Salix* and *Populus* are doubtless among the best of genera. They are so natural that not the least

technical skill is needed to enable any one to distinguish them. He would be a dull forester, however illiterate, who could not everywhere tell a *Willow* from a *Poplar*. But a slight difference in the capsules, together with the more lax sterile aments in *Populus*, is all which the great master can discern as worth naming in the line of technical characters by which to separate them. However, there seems little practical need of even so much, if one appeal as he does to the "Propria *Populi* facies quâ differt à *Salice*."

It is by an inexact and rather figurative use of terms that men ascribe to Tournefort, or to any one who has yet appeared, the credit of having discovered a *scientific* basis for the genera of plants. If this author was in his day—and I doubt it not—the greatest of botanists who had up to that time written a general treatise, it was because of the artist's eye and the artist's delicate feeling by which he was enabled to come at the truth respecting plant-relations where the "scientific" test failed to give a satisfactory result. I take his generic characters, framed upon the basis of floral and carpological organography, to represent his *science* of classifying, and the superadded notes upon the "propria facies" to represent the *art*, the genius of the great master; and the latter was worth more than the science. It was this to which final appeal was always made, and made satisfactorily, where the science had failed. Perhaps habit, general aspect, and sensible qualities are in themselves real scientific factors in classification: but it is certain that they must forever elude our attempts at verbal definition; they are therefore practically excluded from every method of systematizing which aims at being purely scientific. Linnæus, and after him two generations of his disciples, excluded these factors as seeming to be elements of confusion and uncertainty, and admitted only such genera as exhibited one or more technical characters. Thus did the natural genera of Tournefort give place in literature to the empirical and often complex genera of Linnæus: but, as already remarked, the consensus of botanists in our day is in harmony with the Tournefortian rather than with the Linnæan conception of genera.

And now that people are returning, many of them altogether unconsciously, but none the less surely, to the principles which Tournefort adopted from Gesner and Columna, it will be found worth every one's while to make a somewhat careful study of this old work which too early passed from the curriculum of advanced botanical study. It is one of the great masterpieces of botanical learning and sagacity; a classic which, one may almost believe, will some day need to be reprinted. I have touched upon one only, out of several important topics which the serious mention of these volumes will suggest, that of the foundation and definition of a genus. The rest I leave; but one further word to this point.

While the genera of Tournefort are as unstilted and natural as are the living denizens of meadow and wildwood themselves, and while there is no trace of pedantry in the writings of the man, yet, to that forever repeated stiff form of words "——— est plantæ genus flore ——— ex cujus calyce surgit pistillum quod deinde abit in fructum ——," etc., which he chose as a regular framework for the setting of the essential characters of the genus, may perhaps be traced the origin of our modern pedantry; our favorite notion that a genus can not, or shall not be recognized except under a Latin name and a properly formulated "character;" and the cognate stilted notion that an education in modern botanical terminology, and an acquaintance with Linnæus and Bentham & Hooker are a *sine qua non* in the knowledge of the plant world, and that these accomplishments furnish the only secure title to the name of botanist in any country or in any age.

Second Systematic Census of Australian Plants, with Chronologic, Literary and Geographic Annotations. By Ferdinand von Mueller * * * Government Botanist for the Colony of Victoria. *Part I. Vasculares.* * * Melbourne: 1889.

Baron von Mueller is one of the most learned and industrious of living botanists; and the great extent of his labors upon the wonderful flora of the Australian continent is more or less thoroughly appreciated throughout the world. The present treatise, although but a catalogue of orders, genera and species, is wrought out upon a plan in several ways remarkable. There are no descriptions, and yet the book is tenfold more than a mere list of co-ordinated names. There is, I think, no plant catalogue, ancient or modern, which equals it in respect to the learning and the labor that have been lavished on it. The author's modest title-page clause, "With Chronologic, Literary and Geographic Annotations," signifies not only that the geographical distribution of all species is indicated, and that the pages are cited where full descriptions are to be found, but that the original place of publication, with date, is cited for every species, genus, natural order and division of plants. The necessity of reforming the whole system of plant nomenclature according to the rule of priority was early felt by our author, and his invaluable "Chronologic Annotations" have been an outgrowth of his bibliographical researches as connected with the Australian flora, having in view the end of establishing the nomenclature upon the only possible firm basis. The total number of Orders is 156; of Genera, 1409; of Species, 8839: a very vast flora, indeed: and the author has given us the original place of publication, with all the dates, for ten thousand and almost five hundred botanical names: as a book of general

bibliographical and chronological reference, therefore, it should be in the library of every working botanist.

In assigning appellations to the natural families, the law of priority has governed the author, as it ought to govern all writers of such treatises. There is no reason why a generic name should be adopted in deference to its priority, and ordinal names be selected according to one's individual opinion of general suitability. But in his effort to give due credit to the actual founders of Natural Orders, he has often gone to the extreme of amending or altering a name in such wise that it becomes really another name, and one which can not be credited to even the mind, much less to the printed document of the author concerned. Assuming, as Baron von Mueller must, that this course of procedure needs an apology, he gives one. It is found in the preface to the first edition of this admirable Census, where he says: "If, for instance, Haller is regarded as the earliest indicator of Cyperaceæ, it must be conceded that his wording of the order was "Cyperi" in 1742. * * If, however, * * we ascribe it under the name of Cyperaceæ to De Candolle, as defined in 1805, or to St. Hilaire as circumscribed in the same year, or to A. L. de Jussieu who in 1789 adopted the same order as Cyperoidiæ, then we evidently act unjustly in not recognizing prior claims."

I rejoice in Baron von Mueller as in one out of a few eminent botanists of our time who dare to emphasize the ethical relations of scientific labor. We have now, at least in America, a very fair showing of botanical authors who insist upon the rule of priority from the utilitarian point of view; who take this course because it is the only one which promises to give stability. Justice, as a motive in every human action, is surely the broader and nobler motive, and therefore the safer one in the long run at least. But strict justice, as I view it, will everywhere forbid our ascribing to any author a name, or even a syllable, which he did not employ. The "*Cyperi*" of Haller is simply identical, as a name, with *Cyperus*, of which it is only the plural form. The same name can not be applied to a natural order and also to a genus. The mistake

of Haller, and also of Jussieu, was that of supposing that such an usage might be allowed. The honor of having proposed the most satisfactory name for this order, the name Cyperaceæ, belongs to the elder De Candolle; but my dear friend at the antipodes would bestow that honor where it does not fall, namely, upon his and my own great favorite among all eighteenth century botanists, Albert Haller. He is, therefore, unjust to De Candolle. I grant that the greater honor belongs to Haller, as having indicated the family alliance of these plants; and the way out of the difficulty, it seems to me, becomes clear if we recognize another general principle, one which Baron von Mueller for the time appears to have lost sight of, namely, that he who will enjoy the full honor to be gained by the circumscribing of any natural alliance of plants, must assign it a name that is valid. *Cyperi* is absolutely untenable for any natural order, for the reason that there is a genus whose species, if spoken of collectively, are *Cyperi;* and the generic has priority over the ordinal employment of the name. This argument applies, of course, to many of the ordinal appellations employed, too inconsiderately I am obliged to think, by Jussieu. The course taken by me in the Flora Franciscana has seemed to my mind entirely logical, and I entered upon it without the least doubt or hesitancy. If a man give a new genus an untenable name, even my friend in Australia will agree that, with the disappearing of the generic name disappears also the author's name; and the rule is as simple, the way just as plain, where the name is that of a family.

Throughout the book are traces of the author's individuality and originality of view. Extensive inroads are made upon what one of my North American colleagues has facetiously designated as the time-honored Candollean sequence of Natural Orders. That entirely empirical and heterogeneous Division of Endogens, the Apetalæ, is suppressed; and it must be by every modern botanist who regards science as more sacred than his own and perhaps some other people's personal convenience. An entirely original feature in Baron von

Mueller's sequence of Orders lies in the binarily named subdivisions of his Choripetaleæ and Sympetaleæ, which succeed one another thus: Choripetaleæ Hypogynæ, Choripetaleæ Perigynæ, Sympetaleæ Perigynæ and Sympetaleæ Hypogynæ. Under these the various apetalous orders, the gymnosperms of course excluded, for the most part find places according to their real affinities, or at least according to their closest analogies. These subdivisions are evidently a great improvement upon the Candollean arrangement; and I thought at one time of adopting them in the Flora Franciscana. But I am unconvinced that the Choripetaleæ Hypogynæ are truly the most advanced type of plant-organisms. I am thoroughly persuaded that the Leguminosæ are the most perfect of plants, and that other of the Choripetaleæ Perigynæ come next to them. Moreover, the whole system of Hypogynous and Perigynous groups of orders is more or less unnatural: for perigynous stamens and hypogynous stamens are found repeatedly within the same natural order, and even within the same genus. Nevertheless, Baron von Mueller's arrangement must be admitted to show a marked advance from the old one with which all are familiar; and this volume, rich as it is in varied and original suggestions upon plant-affinities, is perhaps even more valuable as being a large treasury of bibliological erudition.

A New Departure in Botanical Nomenclature.

Some of our English friends have been entertaining themselves and us by writing sundry paragraphs in relation to what they have chosen to call a "Neo-American School of Nomenclature."[1] The paragraphs, no doubt, may have afforded some kind of satisfaction to the writers themselves,

[1] Lond. Journ. Bot. xxviii. 157, etc.

and to a proportion of their readers; and, what is not likely to have been intended, they may have served to create in some minds something like a prejudice against certain American botanists. But in all efforts lately made in America, to bring order out of the chaos of our botanical nomenclature, not one new line of action had been taken, up to the time when the last sentence written to our prejudice was published in England and repeated in America. There were only two separate propositions upon which the epithet may be supposed to have been based. Some of us here had determined to use the oldest specific names under whatsoever genus they had been published, and to allow the law of precedence to decide between two generic names where actual priority could not be claimed for one over the other. The first of these usages was followed by the most eminent botanists in Europe from the time of Linnæus down to our day. The second is nearly or quite as ancient, and is adhered to even now by many botanical authorities conspicuous in Europe. Both of them are what may fairly be called classical usages; and Mr. Britten's reasons for attempting to make out the existence of a "Neo-American School" are therefore very obscure, and must be developed more clearly if the attempt is to do any credit to the alarmist's knowledge.

However, if the editor of the London Journal had but waited until this year, I am not so confident he would not have had an actual basis for his imputations: for, to carry the restoration of earliest specific names to the degree of writing *Negundo Negundo* and *Catalpa Catalpa* as binomial plant-appellations is to enter upon a line of action new in botany, as far as I can learn. A precedent for this is found in recent treatises upon Systematic Zoology, but, I think, nowhere else; and there is this to be said in favor of it, that it makes one less exception to the rule of employing the oldest specific names. But in the practice there is involved a natural unfitness which all our sense of what is proper in nomenclature shrinks from. The rudest peasant of the family of Smith would not venture to give an infant son the Christian name

of Smith under any consideration, I think; and Mr. Jones Jones and Mr. Brown Brown would be likely to suffer for their names until they changed them. It is bad enough to have birds and mammals made to carry such appellations. Will not the botanists, after reflection, decide to spare our trees and shrubs and wild flowers?

I am afraid, moreover, that those of our botanists who have announced themselves as in favor of this practice have done so without counting how many such binomials (and even trinomials) there will be. Let us be reminded also that, for example, *Melilotus Italica* and *Melilotus officinalis*, are not with Linnæus ordinary binomials, but specific names under *Trifolium*. Are we really going to write *Melilotus Melilotus Italica*, *Melilotus Melilotus officinalis*, *Melilotus Melilotus Polonica*, *Trigonella Melilotus carulea*, *Pocockia Melilotus Cretica*, and other such? In view of these and some other points not yet duly considered, it is to be hoped we may be persuaded, as our forefathers were, to allow a number of exceptions to the rule of taking up earliest specific names from Linnæus.

Biolettia, a new Genus of Compositæ.

Herb slender, flaccid, decumbent, the stems rooting at the lower joints, loosely corymbose above. Leaves opposite (except the uppermost), sessile. Heads small, on slender peduncles. Involucre subhemispherical: bracts green and membranaceous, linear, subequal, in about two series. Receptacle small, plane or slightly convex, naked. Corollas minute, very numerous, purple, all alike: the slender tube rather shorter than the campanulate-funnelform 5-toothed limb. Style-tips linear, acutish, pubescent, in age very conspicuously exserted. Achenes linear, sharply quadrangular, the angles hispid-ciliolate toward the summit, the manifestly concave

sides dark-brown, glabrous: pappus of 4 barbellate bristles and as many intervening deeply fimbriate-lacerate rounded minute scales.

B. RIPARIA. A foot high or less, pale green and sparsely pubescent: leaves flaccid, an inch long, broadly linear-lanceolate, remotely serrate, somewhat auriculate at the broad base: heads $1\frac{1}{2}$ lines high, $2\frac{1}{2}$ lines broad: achenes barely $\frac{3}{4}$ line long.

This remarkable plant, wearing decidedly the aspect of a small *Erigeron*, but with fruit characters of the Helenioideæ, inhabits low ground along the banks of the lower San Joaquin River, California, where it is associated with *Ilysanthes gratioloides*. In point of habitat, as well as habit, it suggests at once *Eclipta*, and *Spilanthes*, yet it can not by any means be referred to either of those genera; for the receptacle is plane, and destitute of chaff or bristles. The genus is dedicated to the discoverer, Mr. Frederic Theodore Bioletti of the University of California.

NEW OR NOTEWORTHY SPECIES.

XI.

ŒNOTHERA (ONAGRA) DEPRESSA. Annual, the very stout branches 2 or 3 feet long, prostrate, only the spicate ends assurgent; herbage covered with a rather dense but short, somewhat appressed pubescence: leaves elliptic-lanceolate, acute, tapering to a short petiole, the margin rather remotely serrulate: spike elongated, leafy-bracted: calyx-tube 1 inch long or more; tips of the segments not closely contiguous in the bud: petals cuneate-obcordate, barely 5 lines long, yellow: anthers exserted: stigma-lobes linear, scarcely spreading in maturity, of a vivid green.

Cultivated at Berkeley, from seeds brought by Mr. Blankinship from near Custer, Montana. In such fragmentary

herbarium specimens as are usually made of *C. biennis*, this might pass under a superficial examination for some very small-flowered variety of that species; but in habit it appears as something very distinct. It is so prompt an annual that, while the young plants were not above ground before the end of April, the flowering had begun before the end of July—barely three months from the time of the sowing of the seeds.

GODETIA PULCHERRIMA. Puberulent, slender, erect, 1--3 feet high: leaves linear, acute at each end, nearly entire: calyx-tube very broad and short, nearly cyathiform; segments partly coherent and turned to one side under the open corolla: petals $1\frac{1}{4}$ inches long, cuneate-obovate, truncate or retuse at the erose summit, lilac and streaked with white veins above, whitish at the base, dotted throughout with minute elongated spots of dark crimson: stamens equal; filaments lilac; anthers white, these reaching scarcely to the middle of the petals: style elongated; stigma-lobes obovoid, purple: capsule linear, 1 inch long or more, distinctly pedicelled, the sides scarcely costate.

Apparently not rare in southern California, and related to *G. Bottae*, from which it must needs be distinguished specifically on account of its much larger and peculiarly colored corollas, purple stigma, etc. The description is drawn from a specimen sent by Mrs. W. F. Wheeler of Los Angeles Co. Mr. Parish's n. 1899, from Fort Tejon is apparently about the same.

MADIA HISPIDA. *Madaria corymbosa*, var ? *hispida*, DC. Prodr. v. 692 probably. Annual, rather slender, a foot or two high, corymbosely branching from below the middle; the whole plant clothed with a whitish hirsute pubescence, and beneath this almost muriculately scabrous: leaves alternate, narrowly linear, 2—3 inches long, entire: heads on slender peduncles: rays about 10, $\frac{1}{2}$ in. long, deeply 3-lobed, bright yellow: achenes compressed, lunate-claviform in outline, brown, dotted with black.

Very common in middle California, but only at considerable elevations in the mountains. Plentiful on Mt. Hamilton and in the higher mountains south of Tehachapi. Distinguished from *M. elegans*, with which it has long been confounded in all our books, not only by its different habit, absence of all glandular hairiness, small heads, brown achenes, etc., it is as strictly vernal (April to June) as *M. elegans* is autumnal (Sept. to Nov.). The distribution of the two is also different; *M. elegans* being confined to the neighborhood of the sea, or low valleys among the mountains of the interior. The Oregonian MADIA CORYMBOSA (*Madaria corymbosa*, DC. l. c.), frequent in the mountains of northern California, a smaller, less hairy and somewhat glandular species, also vernal, is without doubt distinct from both the others.

PENTSTEMON SONOMENSIS. Suffrutescent and evergreen, about a foot high, slightly puberulent: leaves rather light green, coriaceous, obcordate, mucronulate, denticulate, about a half-inch long and nearly as broad, very shortly petiolate, the uppermost round-ovate, acutish: raceme terminal, sessile: calyx-lobes lanceolate, acuminate: corolla 1 inch long, deep red, the segments nearly equal, apparently not widely spreading: anthers slightly exserted, white-woolly.

Among rocks at the summit of Hood's Peak, Sonoma Co., California, 1891, Miss Atterbury. A singular species, with the habit of *P. cordifolius*, but the woolly anthers of *P. Menziesii;* the foliage quite characteristic.

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PITTONIA.

A Series of Botanical Papers

BY

EDWARD L. GREENE,

Associate Professor of Botany in the University of California.

BERKELEY, CALIFORNIA.

May—August, 1892.

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On Certain Spiræaceæ.

I had long suspected that Bongard's paper on the Vegetation of Sitka, read in the St. Petersburg Academy on the 4th of May, 1831, must have been printed and distributed before 1833; in which case it would antedate much of the first volume of Hooker's Flora. Dr. Otto Kuntze's careful and extensive researches into bibliography have brought forth the fact that Bongard's paper was indeed distributed before the end of 1831. It is therefore inevitable that Lutkea must displace *Eriogynia*. To the species recognized by Dr. Kuntze the following is to be added.

L. Hendersonii. A low much branched and tufted but scarcely matted undershrub: branches leafy at summit only, the leaves crowded but not rosulate, coriaceous and evergreen, spatulate-oblong, entire, acutish, $\frac{1}{2}$ to $\frac{3}{4}$ inches long, rather obscurely silky-pubescent or glabrate: peduncles scapiform, an inch or two long, bearing a rather dense cylindrical raceme of small white flowers: carpels 3 to 5, villous along the suture.

A near relative of *L. cæspitosa*, O. Ktze., but clearly distinct; inhabiting the Olympic Mountains, Washington. Two sheets of specimens are in my possession, presented by Mr. Charles V. Piper, who collected them in 1890. The first sheet was labelled *Spiræa cæspitosa*, the second *Eriogynia Hendersonii*, Canby. I do not find that Mr. Canby has ever published the species.

Spiræa betulæfolia, Pall. Fl. Ross. i. 33. t. 16 (1784). From this Siberian species, all the American species which have latterly been referred to it, are in my opinion to be

Issued May 14, 1892.

separated; and this was the view entertained by Douglas, Nuttall and others who had a field acquaintance with the northwestern shrubs, and an appreciation of the geographical side of the question. But even the herbarium men should have discovered that *S. betulæfolia* in the fruiting state has a good character which entirely fails in all the American plants which have passed under that name. I refer to the narrow and reflexed calyx-lobes. Recognizable by this mark, I have good specimens of this species from the Porcupine River in the interior of northern Alaska; but no other American specimens that I have seen match these, excepting those of a new species characterized below.

SPIRÆA CORYMBOSA, Raf. Préc. Découv. 36 (1814). Occurring in the Allegheny Mountain region only, and ranging from Pennsylvania to Georgia, thus belonging to a climatic belt as different from that of northeastern Asia as can be found outside the tropics; completely isolated from even the North American plants most allied to it—for the distance between its habitat and that of the following species is some two thousand miles—it must have been by ignoring altogether the geographical consideration that any authors became persuaded that the S. CORYMBOSA of Rafinesque could be a synonym of *S. betulæfolia*. It is really very distinct; though the usual analogy between East Asian and East American related species of plants holds here; for the inflorescence is pubescent in these two, while it is perfectly glabrous in all the correlated West American plants. *S. corymbosa* has, however, those broad and merely spreading, never reflexed, calyx-teeth, which constitute a distinguishing feature of all the endemic American species when compared with the Siberian type. The large and long leaves are another good character for *S. corymbosa*. Doubtless also in the mode of growth another mark may be found by those who are privileged to study the species in its native wilds. For my only fruiting specimen I am indebted to my friend Harry Patterson.

SPIRÆA LUCIDA, Dougl.; Hook. Fl. Bor.-Am. i. 172 (1833, a manuscript name by Douglas, printed as a synonym): *S. betulæfolia* of recent American authors, in part. Stems erect, mostly simple, 1 or 2 feet high, of annual growth from horizontal running and woody not deep-seated rootstocks or roots: lowest leaves small and obovate, the upper oval, 1 or 2 inches long, acutish, incisely serrate, glabrous throughout, pale and glaucescent beneath: inflorescence a glabrous terminal compound fastigiate corymb: flowers white: calyx-tube broadly campanulate, the broadly ovate lobes short, embracing the base of the follicles; these 5, glabrous or puberulent, 1 to 1½ lines long, tipped with a style half as long.

Var. ROSEA. *S. betulæfolia*, var. *rosea*, Gray, Proc. Am. Acad. viii. 381. Subterranean characteristics not noted: stem more slender, rather freely branching: corymbs at the ends of all the branches, small: flowers rose-red.

The type is common in dry woods of Montana, Idaho and eastern Washington. Excellent specimens, showing the peculiar mode of growth from an underground horizontal axis, have been collected near Helena and distributed by Mr. Kelsey. Farther westward, at Thompson's Falls, which must be near one of Douglas' stations, I obtained it in 1889, in good fruit, the fruiting corymbs measuring from three to seven inches in breadth. The variety *rosea* is known only from subalpine heights on the mountains, from middle California northward to Mt. Rainier. It is very likely to prove specifically distinct.

SPIRÆA PYRAMIDATA. Near the type of the preceding and apparently of the same habit, but taller; the simple stem leafy throughout, and bearing at summit a large very dense pyramidal panicle of small white flowers: calyx-lobe broadly ovate, reflexed: follicle glabrous, scarcely a line long, tipped with a style of equal length.

Dry woods of the lower Yakima River, near Clealum, Washington, August, 1889; collected by the writer. This may be the *S. densiflora* of Nuttall, of which the name only

has been published. It is very distinct from its allies in the form of the inflorescence, the character of the calyx, and the size of its flowers and fruits.

New or Noteworthy Species.

XII.

Lotus (Syrmatium) Biolettii. Perennial, diffuse. the slender and somewhat wiry nearly prostrate branches a foot or two in length and almost forming a mat: herbage cinereously or canescently pubescent with short and closely appressed hairs: leaflets usually 4, cuneate-obovate, obtuse, 2 to 4 lines long: umbels on slender peduncles little exceeding the leaves, unifoliolate-bracted, 6 to 10-flowered: calyx less than a line long, narrowly funnelform, the triangular pointless erect teeth scarcely a third as long: corolla 2 lines long, deep yellow, turning dark red: pod strongly arcuate, slender-beaked, the rather broad body 1 or 2-seeded.

On dry ridges above Mill Valley, Marin Co., California, collected by Mr. Bioletti.

The description of *Trifolium fucatum* given in the Flora Franciscana applies to no species very closely, but covers loosely an aggregate of things which I now feel able to separate and to characterize. I had feared at first that they were confluent varieties, but am now convinced that they are thoroughly distinct. The essential characters of the true *fucatum* must first be given.

Trifolium fucatum, Lindl. Bot. Reg. xxii. t. 1883 (1836): *T. physopetalum*, Fisch. & Mey., Ind. Sem. Petr. iii. 47 (in the same year. but presumably later). Branches stout and somewhat fistulous, often a foot long: leaflets an inch long,

rhombic-obovate, rather conspicuously spinulose-serrate or -dentate, in texture somewhat succulent: heads $1\frac{1}{4}$ to 2 inches broad, 13 to 20-flowered: flower 1 inch long or more; calyx-tube campanulate, only $1\frac{1}{2}$ lines long; none of the teeth as long as the tube, all triangular, the two upper short and acute, the three lower tapering to a setaceous point; corolla cream-color, with a slight greenish tinge, fading pinkish, the keel-petals with a dark purple spot: legume rather long-stipitate.

Common in low and rather moist meadow lands throughout western California; most frequent along the seaboard. Leaflets commonly marked by conspicuous dark-colored cross-bars.

TRIFOLIUM FLAVULUM. Pale green and glaucescent, stoutish, often larger than the last (the branches not rarely 2 feet long), but heads not half as large: leaflets $\frac{1}{2}$ to $\frac{3}{4}$ inch long, broadly obovate, from pectinate-denticulate to entire: heads $\frac{1}{2}$ to 1 inch broad, 5 to 12-flowered: flower seldom $\frac{1}{2}$ inch long: calyx-tube a line long, the shortest of the teeth decidedly longer, the 3 lower about twice as long, all slender-subulate from a broad base: legume subsessile.

Same range as the preceding, but far more abundant: never intergrading or hybridizing with it, hence not a small-flowered variety, but specifically distinct. Possessed of more vitality than the last, it is often found on higher ground and in poorer soil.

TRIFOLIUM VIRESCENS. Near the two preceding, but slender and only half as large: leaflets $\frac{1}{2}$ inch long or more, inverse-deltoid, *i. e.*, broadest at summit and truncate, sharply serrulate: peduncles long and slender, more than twice the length of the leaves: heads less than an inch broad, 9 to 15-flowered: flower 7 or 8 lines long, greenish; calyx-teeth all slenderly subulate, the two upper shorter than the tube and closely approximate, the lower about twice the length of the tube.

Of different habitat from the other two, being found in the hilly parts of Marin and Sonoma counties; and, owing to the

difference in habit, as well as habitat, not susceptible of being construed as intermediate between them, or as a variety of either.

TRIFOLIUM GAMBELII, Nutt. Pl. Gamb.; Proc. Philad. Acad. iv. 8 (1848). There are unmistakable indications, in Nuttall's description of this species, that he had before him among other plants the true *T. fucatum;* but that to which he ascribes trifid calyx-teeth, and which should be taken as the type of *T. Gambelii*, would not seem to be referable either to *T. fucatum* or *T. flavulum.* Certain specimens in my herbarium, which I am forced to regard as typical of *T. Gambelii*, are in general aspect more like *T. flavulum;* but the heads are only 3 to 5-flowered; and, while the upper lip of the calyx consists of two simple subulate teeth, the lower lip is greatly enlarged and variously cleft into 6 or more long subulate-setaceous segments, some of which may easily be construed as the two segments of one bifid tooth, thus answering to Nuttall's account of the calyx in his species. The type of *T. Gambelii* was of southern California; and my specimens come from the eastern base of Mt. Diablo, a part of the country already become noted with me, as a locality in which many plants, otherwise peculiar to southern California, are found in abundance.

ALYSSUM AMERICANUM. Perennial, the rather slender suffrutescent stems tufted from a long tap root, leafy up to the inflorescence and 5 to 8 inches high: herbage, even to the sepals, canescent with a very dense and closely appressed stellate pubescence, the lower face of the leaves even white: leaves approximate, spatulate-obovate, acutish, 4 or 5 lines long: flowers yellow, in a dense terminal corymb which in fruit lengthens into a raceme: pods obovate, $1\frac{1}{2}$ lines long, tipped with a persistent style $\frac{1}{2}$ line long.

Collected on the Porcupine River, in the interior of northern Alaska, 1891, by Mr. J. Henry Turner. The specimens are in flower only, though with remains of the fruit of a former

season. This is the first genuine *Alyssum*, of Old World type, known to have been found in North America.

STREPTANTHUS BIOLETTII. Annual, rather slender, sparingly branching, 1 to 1½ feet high, the branches not flexuous, the herbage pilose-hispidulous, the pods often fairly hispid: lower leaves coarsely and sinuately toothed: racemes not secund: flowers 4 or 5 lines long; sepals of a brilliant but rather dark metallic purple; petals with white-margined purple blade: upper pair of filaments much the longest, united for about two-thirds their length, thence divergent, their anthers half as large as those of the shorter stamens, apparently fertile: pods slender, erect, glabrous or hispid.

On Hood's Peak, Sonoma Co., California, May 1, 1889, Mr. F. T. Bioletti.

STREPTANTHUS PULCHELLUS. Annual, stoutish, only 3 to 6 inches high, hispidulous throughout: lowest leaves unknown; the lower cauline oblong-lanceolate, tapering below, but sessile by a rather broad base, upper ovate-oblong, broadest at the sagittate-clasping base, all rather coarsely and pinnately toothed: raceme subsecund: flowers 4 or 5 lines long; calyx deep lilac-purple, the sepals subequal, broadest at base, sharply carinate, the keel with some scattered short bristly hairs: limb of upper pair of petals conspicuous, dark-purple, of the lower pair very small: upper pair of stamens united to near the summit, their subsagittate anthers approximate, little reduced in size, the other 4 stamens in very unequal pairs, with large subsagittate anthers: stigma sessile: pod unknown.

Dry ridges on the southern flanks of Mt. Tamalpais, Marin Co., California, May, 1892, Mr. Marshall A. Howe. The plant was observed by the present writer, near Tomales, several years since, and taken for *S. hispidus;* but it is of a very distinct species.

RANUNCULUS BIOLETTII. Annual, glabrous and notably succulent, 1 to 3 inches high; radical leaves on elongated peti-

oles, round-ovate to deltoid and broadly rhomboid, repand-toothed or entire, only 3 to 5 lines long: cauline narrowly elliptical to linear-lanceolate, entire: stems simple and almost scapiform or sparingly branched: flowers minute, yellow: sepals subscarious, not reflexed; petal mostly 1 only; stamens very few: achenes rather numerous in a small globose head. little compressed, delicately tuberculate on the sides, neither margined nor beaked, scarcely $\frac{1}{2}$ line long; stigma minute and sessile.

In moist land, on the plains of Sonoma Co., California. May 1, 1892, Mr. F. T. Bioletti; a peculiar and very dwarf species, somewhat resembling the Chilian plant figured in the Botany of Beechey's Voyage (t. 2), under the name of *R. humilis;* but that has a different foliage and an achene beaked by a manifest style. In ours the ovary (and achene) is marked by a green crest-like elevation of the whole upper part, in the midst of which the depressed stigmatic organ may be detected only by the help of a lens.

Bolelia humilis. Very dwarf, the rather stoutish stem only about an inch high, the linear ovaries and capsules quite as long: segment of the calyx linear, acutish, unequal, a line or two in length: corolla minute, white. scarcely a line long. bilabiate, but the segments of upper and lower lips not very dissimilar. all ovate-oblong and acute.

Moist plains, in Sonoma Co., along with *Ranunculus Bioletii*, and by the same collector. The species is a most remarkable one on account of the insignificantly small and white corolla, reminding one again of the genus *Hourellia.*

Erigeron leptophyllus. Near *E. Coulteri*, but rather taller, 10 to 18 inches high, leafy mostly at or near the base. the cauline foliage reduced and inconspicuous: pubescence short and spreading. stiffish, most abundant on the involucre which is neither glandular nor viscid: radical and lower cauline leaves 3 to 5 inches long, narrowly oblanceolate. obtuse, mucronulate, entire or with a few remote serrate

teeth; cauline 1 inch long or more, entire, acute: heads 2 or 3; bracts of involucre in about 2 series, narrowly linear, more or less recurved at tip: rays white, very narrow and numerous (about 100), 1 inch long.

Collected by the writer, at the limit of trees, on Mt. Evans, central Colorado, in the summer of 1875.

ERIGERON HYPERBOREUS. Perennial, with long tap root and no caudex: stems stoutish, decumbent, 6 or 8 inches high, usually monocephalous: herbage green but roughish with a short and rather dense hispidulous pubescence: radical leaves oblanceolate, entire, obtuse, 2 to $2\frac{1}{2}$ inches long, narrowed to a short slender petiole; cauline rather numerous, oblong-lanceolate, sessile: head short-peduncled, 4 lines high: bracts of involucre moderately unequal: rays 40 or more, 3 or 4 lines long, rather broad: pappus double, the outer setulose.

Porcupine River, Alaska, Mr. Turner. Allied to *E. caespitosus*, but lacking the woody caudex of that species, and with a different pubescence.

ERIGERON TURNERI. Stems mostly solitary, 12 to 18 inches high, stoutish, strictly erect, from rather slender ascending or horizontal rootstocks: herbage rather conspicuously hirsute, the hairs of the foliage spreading, of the stem more or less distinctly retrorse: radical leaves ascending, 2 to 4 inches long spatulate-oblanceolate, obtusish, remotely crenate or serrate; cauline rather many, lanceolate, acute, entire: heads 2 to 5, large: bracts of involucre recurved at tip: rays $\frac{1}{2}$ inch long, whitish, very numerous (80 or more).

Habitat of the last, and by the same collector. Species somewhat suggestive of *E. bellidifolius*, but not stoloniferous, nor leaves depressed.

CALLICHROA NUTANS. Annual, slender, 3 to 6 inches high, branching loosely and somewhat corymbosely: leaves all linear, entire, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, the lower pairs opposite, all

[Issued May 26, 1892.]

ciliate with hirsute hairs: branches, peduncles and involucre glandular-pubescent: heads 3 or 4 lines high, on slender peduncles of 1 inch long, nodding both before and after flowering: involucre campanulate: rays 5 to 7, yellow, 2 lines long, deeply 3-cleft: achenes black, hispidulous; pappus longer than the achene, of about ten unequal linear-lanceolate acuminate white paleæ, their margins barbellate.

Mountains of Sonoma Co., California, May 15, 1892, collected by Mr. Bioletti. Seen also by the writer, about a month earlier, on the flanks of Mt. St. Helena; the plants not then in flower. The species is a very remarkable one, on account of the nodding heads. Its nearest relative is perhaps *C. Jonesii*, i. e. *Layia Jonesii*, Gray. CALLICHROA is the oldest and therefore the only admissable generic name for those plants which, in our books, are called *Layia*.

PSACALIUM STRICTUM. *Prenanthes stricta*, Greene, Pitt. ii. 21 (1889). *Luina Piperi*, Robinson, Bot. Gaz. xvi. 43, t. 6 (1891). My specimens of this rather ambigious plant were long past flowering, and in mature fruit, when I collected them. The whole aspect of the herb was that of a Cichoriacea; and, I should say that, in gathering it I encountered the milky juice characteristic of that family of composites. However, since the corollas are not ligulate—and the few withered remains of them in my specimens, when once examined, show that—I can not, after the lapse of nearly three years, assert positively that the herb is milky. Assuming, then, that it is a plant with watery juice, it must be allied to *Senecio*. I believe it is a good congener of Cassinis' type of *Psacalium*, to which also *Luina* itself, as to the typical species, may or may not be logically reducible. Certain, however, it is, that the present species differs widely from true *Luina* in habit. The figure given in the Botanical Gazette was confessedly very unsatisfactory, having been drawn from a mere inflorescence which Mr. Piper had broken off and put in his pocket. The present writer, obtaining his plants from precisely the locality afterwards explored by Mr. Piper, made

four specimens, all as complete as the lateness of the season permitted. One of these is in the herbarium of Columbia College; another has been placed in the National Herbarium at Washington.

SILENE PURPURATA. Stems numerous, from slender running rootstocks, 6 to 18 inches high, rather slender: whole plant pubescent and slightly viscid: leaves rather remote, linear-lanceolate, acute, 1½ inches long: flowers in terminal and subterminal peduncled or subsessile cymes of about 3: calyx purple, rugose-veiny, clavate, not inflated, ½ inch long or more; limb of petals more than half as long, white or pink, obcordate or bifid, appendaged at base.

On the Porcupine River, in the interior of northern Alaska, 1891, Mr. J. Henry Turner.

CERASTIUM GRANDE. Stems simple, with few and long internodes, 1 or 2 feet high, from slender rootstocks: herbage vivid green, hirsute-puberulent: leaves linear-acuminate, 1½ to 3 inches long, only 1 to 3 lines broad: flowers 1 to 5, erect, short-peduncled at summit of stem: sepals oblong-lanceolate, obtusish, scarious-margined, finely striate-nerved, 3 or 4 lines long; corolla 1 inch broad or more, the petals with a sharply triangular notch at summit: capsule straight, ¾ to 1 inch long, the teeth short and closely circinate-revolute.

Porcupine River, northern Alaska, Mr. J. Henry Turner, 1891.

TISSA RUBRA, var. PERENNANS. *Lepigonum rubrum*, var. *perennans*, Kindb. Monogr. 41. On the bleak open hills beyond south San Francisco there grows in great abundance a perennial *Tissa*[1] which, if it were only a small annual,

[1] I have no doubt that the *Corion* of Mitchell (See Britton, in Journ. Bot. xxix. 303) is identical with *Tissa*, and, counting priorities from Linnæus, it is, of course, fifteen years older. But *Corion* is a very ancient plant-name. The Greeks seem to have applied it to Coriander: and it has been employed as generic name for various umbelliferous plants, both in ancient and modern times, even since Linnæus.

would pass for genuine *T. rubra.* It forms mats a foot broad, more or less, and answers perfectly to Kindberg's description of the Swedish perennial state of this species. From the peculiar character of the soil, and other considerations, I can not doubt that this plant is indigenous at San Francisco. This view is confirmed by my having this year collected the same plant, upon similar ground, in Knight's Valley at the western base of Mt. St. Helena; and still later Mr. Jepson brings it from the lower Sacramento. It differs from the typical *T. rubra* in no other points save its great size, and the perennial duration.

BREVOORTIA VENUSTA. Corm and leaves as in *B. Ida-Maia,* but the scape not as tall (1 or 2 feet): flowers more numerous in the umbel, and on shorter pedicels: perianth about an inch long, the ovate segments about $\frac{1}{4}$ inch, recurved, the whole organ of a rich deep rose-purple on the outside, but the staminodia and the inside of the perianth-segments pinkish: anthers much shorter than the staminodia.

This elegant species is known to me only in plants now flowering in the garden of the University, at Berkeley. The corms were purchased from a dealer, as those of *B. Ida-Maia;* but the perianth in that species is fully a third larger, its tube deep scarlet, the segments being of a light green; its anthers also are more than equal to the staminodia in length, *i. e.*, slightly exserted beyond them. The perianth in the new species is distinctly constricted under the segments, and the segments are notably larger in proportion to the length of the tube; so that this plant decidedly weakens the genus, tending to unite the type to *Brodiæa.*

FRITILLARIA RECURVA, VAR. COCCINEA. More slender than the type, only a foot or two in height, few-leaved and only 1 to 3-flowered; perianth a third smaller, or even only half as large, of a brighter scarlet, more strictly campanulate in form, and the tips of the segments not in the least recurved.

On Hood's Peak, Sonoma Co., Calif., May, 1892, Mr. Bio-

letti. This seems to be no more than a variety of *F. recurva*; but its habitat is far to the southward of the recorded range of the species.

PLAGIOBOTHRYS CALIFORNICUS. *P. rufescens*, Gray, Proc. Am. Acad. xx. 282, not of Fisch. & Mey. Seldom less than 1 foot, often 2, not rarely 2½ ft. high, with an erect main stem and several long decumbent trailing branches, all from a tuft of radical spatulate-oblanceolate leaves: spikes a foot or two in length, very lax (the fruiting calyces an inch apart); calyx cleft almost to the base, the segments persistent: nutlets 1½ lines long, nearly a line broad in the middle, abruptly stout-beaked, the nearly orbicular body sharply carinate and laterally crested, with or without sharp transverse rugosities and intervening muriculations.

Very common in the interior of California, from Los Angeles to the borders of Oregon, on the open plains, and among the lower foothills; abundant about Antioch, Vacaville, etc.: apparently first collected by Mr. Howell, near the Oregon line, many years ago. It was the discovery of this species which led to the restoration of the two genera *Plagiobothrys* and *Cryptanthe*, which American authority had unwarrantably merged in *Eritrichium;* and Dr. Gray, without knowledge of the mature fruit of the Chilian plant, assumed this to be identical with the *P. rufescens* of Fischer & Meyer. He admitted, however, at the place I have cited, that the South American plant was not credited with that sharp keel of the nutlet which is so conspicuous in ours. My mature specimens of the plant of South America show that this keel is wanting in the true *P. rufescens*. And in that species the nutlet is much smaller (as is, indeed, the whole plant), and favose-reticulate rather than transversely rugose with parallel ridges. With fair specimens in hand it is impossible that a botanist should confound the two species.

ALLOCARYA STRICTA. Slender, strictly erect and somewhat succulent, simple or with several scarcely divergent spicate

branches above, barely 5 or 6 inches high, glabrous, or nearly so, all except the floral leaves opposite: spikes dense, 1 or 2 inches long: flowers very small, white, with yellow centre: calyx segments closed over the immature fruit: nutlets light gray and, under a lens, vitreous-shining, long-ovate, about $\frac{1}{2}$ line long, rough with numerous close transverse rugosities; insertion supra-basal, the scar linear with dilated base and about one-third the length of the nutlet.

Abundant in boggy places about the warm sulphur springs at Calistoga, California; collected by the writer, April 20, 1892. Species as definitely marked in character as it is peculiar in aspect. Perhaps quite local.

CRYPTANTHE KELSEYANA. Annual, stoutish, rather low, the racemose branches widely spreading; the whole plant very hispid: racemes rather dense, biserial: calyx about 3 lines long, very hispid: nutlets 4, of which three are gray, narrowly ovate-acuminate, a line long, and sparsely tuberculate, the fourth much smaller, (abortive?) reddish-brown, smooth, and persistent; scar of the subulate above a small rounded merely supra-basal arcola.

Collected by the author, at Elliston, Montana, 6 Aug., 1889, and dedicated to his esteemed friend, Rev. F. D. Kelesey, the resident botanist of that region. The species is nearest *C. Pattersonii*, which has four equal and consimilar smooth nutlets.

CRYPTANTHE BARTOLOMÆI. Aspect, pubescence and inflorescence of *C. Utahensis*, but the minute ($\frac{1}{2}$ line long) ovate-lanceolate nutlets (4 and consimilar) perfectly smooth and lucid, and without margin; the ventral groove shortly bifurcate at the base, but closed throughout.

Bay of San Bartolomé, Lower California, Lieut. Pond, 1889. A connecting link between the *oxygona* and *leiocarpa* groups in the genus.

COLLINSIA ARVENSIS. Erect, simple or with several nearly erect branches from the base, 10 to 18 inches high, glabrous

except the very sparsely setulose-hairy leaf-margins: lowest leaves oval or oblong, ½ inch long, on petioles of equal length, coarsely toothed or somewhat lobed; cauline from lanceolate to linear, sessile, revolute: flowers loosely racemose (1, 2 or rarely 3 at each upper node), deep violet-purple, ¾ inch long: calyx-teeth lanceolate-subulate, twice the length of the tube; corolla with compressed saccate tube as broad as long (¼ inch), the upper lip half the length of the lower, and paler; filaments very sparsely hirsute below.

Very common in grain-fields at Knight's Valley, Sonoma Co., Calif., and in adjacent Lake and Marin counties. One of the largest and most beautiful species of the genus, apparently confused, hitherto, with the small and insignificant *C. sparsiflora*, the pale flowers of which are seldom a third as large, the whole herbage finely puberulent, etc.

On Certain Californian Labiatæ.

The most natural of the so-called Natural Families of plants, such as the Umbelliferæ, Cruciferæ and Labiatæ, though richly abounding in good species, have relatively few natural genera. I have heard that some recent writer upon the Labiatæ has raised more or less seriously the question whether the whole family constitutes more than a single genus. And, while no systematic botanist would be disturbed by the suggestion, it can scarcely be doubted, that a great many of our so-called genera of Labiates, are unnatural, and based upon very feeble marks of distinction; such as, in less natural families, would scarcely establish subgeneric groups.

Firmly believing this to be true, I suppose it may be attributable to this, that our most voluminous authors (and therefore the most respected authorities), have usually been herbarium men, rather than botanical travelers and observers,

and have so failed in knowledge of the habit and sensible properties of the subjects of their study; and habit will sooner or later be received as of more significance in delimiting genera, than technical character. In these very natural orders, habit must largely determine the limits of genera. But it is in dealing with these families, that our most distinguished systematists of the herbarium, have been driven to the magnifying of every little difference in the form of corolla and posture of stamen, into a character, in order that, with their imperfect resources, they might have definable genera. For example: the Pacific American species of *Trichostema* with the Atlantic *Isanthus*, form a group so eminently natural, that a blind man would generalize them into one; for they all have one and the same peculiar odor, which is not like that of any other plants of this or any other family; and they are all so much alike in habit, inflorescence, and everything else save the shape of the corolla, that, in no natural system of classification can they be resolved into two genera. Even Linnæus, supposed to have been the most artificial of systematists, did not force these plants asunder. And in *Trichostema*, with *Isanthus* included, there is no wider range between irregularity and regularity in the form of the corolla,[1] than is displayed in *Pentstemon*, or even in *Caprifolium*.

No botanist, whether of much or little experience, coming into California from Europe or eastern America, and meeting with our native kinds of sage, would entertain a doubt of their being perfect Salvias, botanically speaking. But they have a calyx differing somewhat from that of the best types of *Salvia*, and only one of the connectives of the anthers bears a pollen-cell, the other connective being reduced or obsolete. There is, however, no dearth of admitted Salvias in which one of the connectives is reduced and sterile. On some such

[1] The figure of *I. cæruleus* in Michaux is very misleading and erroneous, showing as it does, a corolla with broad rounded lobes like those of a *Myosotis;* but that of *Dillenius* (Elth. t. 385), though on the whole much less faulty, perhaps slightly exaggerates the irregularity.

grounds as these, Mr. Bentham erected the principal Californian Salvias into a genus *Audibertia*. Its best mark is the more irregular and, as Asa Gray denominated it, "more spathaceous" calyx. It was not, however, this character which had most weight with Mr. Bentham; for two Californian species, with the same kind of calyx, he left in *Salvia*.

The genus seems wholly indefensible; but were this otherwise, it would need a new name; because it is the second of two genera to which Mr. Bentham assigned the name *Audibertia*. The first has been merged in *Mentha*, it may be permanently, or it may be temporarily.

To my statement that the Audibertias of the Californian flora are Salvias in habit, as well as floral structure, there is one exception. I have always felt that the *Audibertia polystachya* was not congeneric with the other shrubs with which it has been associated. In habit it is quite peculiar. No *Salvia* has such an inflorescence, or such a corolla. Its characters, as a genus, will be given later. I here propose for it the name

RAMONA POLYSTACHYA. *Audibertia polystachya*, Benth. Lab. 414 (1836); DC. Prodr. xii. 360.

For most of the species referable to *Salvia* new names are needed, seeing all those imposed by Bentham are common adjectives already preoccupied in that large genus.

SALVIA CARNOSA, Dougl. in Bot. Reg. xvii. t. 1469 (1831). *Audibertia incana*, Benth. l. c. This is the plant which Mr. Bentham had as type of his *Audibertia* number two. In flower and foliage it is less like Salvias in general than most of its West American kindred; but its discoverer, Douglas, it appears, had no thought of it as representing a new generic type.

SALVIA MOHAVENSIS. *Audibertia capitata*, Gray, Proc. Am. Acad. vii. 387 (1868). Related to the preceding; perhaps local on the summits of the Providence Mountains, which rise out of the midst of the Mohave Desert.

[Issued July 22, 1892.]

Salvia Sonomensis. *Audibertia humilis*, Benth Lab. 313 (1836); DC. Prodr. xii. 359. Mr. Bentham mentioned the close resemblance which this plant bears to the common garden sage; but he did not know that the odor and flavor of the herbage are nearly the same. It is a genuine American analogue of *Salvia officinalis*. The leaf-bearing part of the plant is prostrate and densely matted, only the peduncles being erect. It is not so rare a species as Dr. Gray supposed; being found in great plenty at middle elevations on all the higher mountains of Sonoma and Lake counties.

Salvia mellifera. *Audibertia stachyoides*, Benth. Lab. 313 (1836); DC. Prodr. xii. 359. Ranging from San Mateo County southward to Lower California; one of the principal bee-plants, and commonly called Black Sage.

Salvia Palmeri. *Audibertia Palmeri*, Gray, Bot. Calif. i. 601 (1876).

Salvia Clevelandi. *Audibertia Clevelandi*, Gray, Proc. Am. Acad. x. 76 (1874); Bot. Calif. l. c. This and the preceding are little known species of the southern extremity of the State.

Salvia leucophylla. *Audibertia nivea*, Benth. Lab. 313: DC. l. c. Common in the southern counties; the White Sage of the bee keepers.

Salvia spathacea. *Audibertia grandiflora*, Benth. Lab. 312; DC. l. c. A coarse herbaceous species, the foliage and habit vividly recalling the *Sclarea* phase of Old World Salvias.

Remarks on Certain Pentstemons.

The genus *Pentstemon*, separated from *Chelone* in 1748, by Mitchell, was not admitted by Linnæus, who referred the species all to *Chelone;* and this view obtained with most of the Old World botanists until about sixty years since. The sepals of *Chelone* are broad, obtuse and concave. In *Pentstemon* they are narrow, acute or acuminate and plane. On this one difference in character the genera may be held distinct, and probably ought to be. The winged character of the seeds, formerly supposed to hold as a second mark of *Chelone*, fails. That considerable group of species belonging to the Pacific slope, of which *Gerardia fruticosa*, Pursh, is the type, which group Asa Gray in the earlier volume of the Synoptical Flora reduced to one, as *P. Menziesii*, but afterwards, in the Supplement, began to segregate, exhibits freely here and there the more or less distinctly wing-angled seeds of *Chelone;* but these are true Pentstemons by the calyx and the habit. The same is true of another and somewhat different plant of the West, which has by most authors hitherto been treated as a *Chelone*, namely,

P. NEMOROSUS, Trautvetter, in Mem. Acad. Petrop. 1841. 250. *Chelone nemorosa*, Dougl., in Lindl. Bot. Reg. xiv. t. 1211 (1828). Even if the seed character ascribed to *Chelone* had not been found to recur again and again in true *Pentstemon*, still this plant would be of this genus rather than the other, on account of its sepals and its agreement in habit. And, a true estimate of the seed character having been reached, there can be no doubt that if Pentstemon is to be retained, here is where the species belongs, as Dr. Trautvetter long ago maintained.

As a first hint of how difficult a problem in western botany is awaiting solution in respect to that section of the genus of

which the *Gerardia fruticosa* of Pursh is, phytographically speaking, the earliest type, I shall give a list of names of what have been separated from it by some authors, and merged in it by others.

1. *Pentstemon Scouleri* (Dougl., under *Chelone*), Lindl. Bot. Reg. xv. t. 1277 (1829).

2. *Pentstemon crassifolius*, Lindl. l. c. xxiv. t. 16 (1838).

3. *Pentstemon Menziesii*, Hook. Fl. ii. 98 (1840, or earlier).

4. *Pentstemon Douglasii*, Hook. l. c.

5. *Pentstemon Lewisii*, Benth.; DC. Prodr. x. 321 (1846).

6. *Pentstemon Lyalli*, Gray, Syn. Fl. Suppl. 440 (1886).

7. *Pentstemon Newberryi*, Gray, Pac. R. Rep. vi. 82. t. 14 (1857).

8. *Pentstemon Sonomensis*, Greene, Pittonia, ii. 218 (1891).

Over and above these, there exist in some of our herbaria two or three plants of the group, manifestly not referable to any of them, but still unnamed and unpublished. Now whether these eight names represent four or five species or a dozen, is a question which, at the rate of progress commonly made in such work, it may take another hundred years to solve. The plants occupy range of from twelve to fifteen hundred miles north and south, and, at least in the latitude of the northern U. S. boundary, ranging half that distance east and west. Some forms are found in the moist climate of the Pacific shores; others inhabit most arid districts of the remote interior. Various others are confined to alpine and subalpine heights of different mountain ranges. No man need attempt to either segregate or combine the species who has not a practical knowledge of the geographical and clima-

tological aspects of the question. Still another difficulty confronts the closet botanist in the fact that, diverse as are the hues of herbage and colors of the corolla, both almost invariably blacken as soon as dry; and the confessedly important item of form of the corolla, can only be studied well in the fresh specimen.

In my own travels I have met with no more than half the types of the above-named species; but that is more than any of my predecessors in the discussion of them had seen: and, while I am far from being in a position to solve the whole problem and reduce the synonymy of the forms, a number of new points looking to a final solution are clear to my mind, and it is these which I desire here to place upon record. The following I feel confident deserve the rank of species; though they are all merged in one, under the name of *Pentstemon Menziesii*, in even the Supplement to the Synoptical Flora where Dr. Gray began the segregation of things which, at the time of issuing the body of the volume, he had confounded with "*P. Menziesii.*"

P. FRUTICOSUS. *Gerardia fruticosa*, Pursh, Fl. ii. 423. t. 18 (1814). *Pentstemon Lewisii*, Benth. DC. Prodr. x. 321 (1846). Possibly both *P. Scouleri* and *P. crassifolius*, Lindl. and also *P. Douglasii*, Hook., are synonyms of this; but it seems quite as probable that they are good species awaiting reinstatement, especially *P. crassifolius*.

P. fruticosus is a tufted shrub commonly a foot or two in height, with lateral leafy and sterile branches, the central ones bearing peduncled racemes. Pursh's figure shows but a portion of a flowering branch. The foliage as a rule is more remotely and acutely serrate than the original figure shows. The large corollas are of a lilac-purple. The anthers are rather deeply included; the sterile filament long and glabrous. The stem is puberulent, but the leaves are glabrous, of a bright green, not in the least glaucescent, and do not very promptly blacken in drying. The species is plentiful in the arid districts of the interior (two mountain ranges

inland) of Washington, Idaho and Montana. It has not, so far as known, an extended range north and south. I have it in a reduced state, from near Banff in British Columbia. The nearest relative of this species is

P. LYALLI, Gray. A taller plant, equably leafy up to the inflorescence; leaves lanceolate-acuminate; flowers larger, but relatively narrower; sterile filament glabrous; neither herbage nor corolla soon blackening in the dried state. This seems to occupy a more northerly portion of the same general region inhabited by *P. fruticosus;* but the next is the easternmost representative of the group.

P. MONTANUS. *P. Menziesii*, Tweedy, Fl. Yellowst. (excl. var. *Douglasii*) not Hook. Stems 6 inches high, herbaceous and of annual growth from a slender subterranean caudex or rootstock, and, with the leaves cinerously puberulent, almost equably leafy up to the inflorescence: leaves oblong- to ovate-lanceolate, the lower obtuse, the upper acute or acuminate, all an inch long or less, saliently dentate: flowers in from one to three pairs: corolla 1 inch long, the tube scarcely ventricose, the color "pink-purple;" sterile filament naked.

This, Mr. Tweedy's n. 866, from alpine heights on the mountains of Yellowstone Park, is manifestly a very good species, readily distinguishable from *P. fruticosus* by its herbaceous character, the stem leafy to the top (no sterile shoots), and the pubescence of the foliage. The corollas in the dried specimen are black; the foliage not darkened. Mr. Tweedy remarks that in this fresh the corolla is pink-purple, and that in the "var. *Douglasii*," (which may be the true *P. fruticosus*), it is violet-purple.

P. MENZIESII, Hook. Fl. ii. 98., excl. syn. *Gerardia fruticosa*, Pursh. Although Sir William Hooker guessed the Menziesian plant and that of Lewis to be the same, and only meant to propose a new name that should include both, the two are surely distinct, and that of Menzies may retain the

name given it, seeing this is what the author had chiefly in view, unless *P. Scouleri* should be proven identical with it: and then it would take that name, as being much older. For the habitat of this species, we leave the "dry pine forests" of Lewis—the arid ultramontane interior of the continent,—and go down to the cool moist seaboard climate. Menzies' type is from Nootka; and representative specimens, from Mt. Benson, Vancouver Island, are distributed by Mr. Macoun. The plant is a low densely matted shrub, only the racemes rising erect out of the cespitose mass. The leaves, both as to size and form, are very unlike those of *P. fruticosus*. The flowers are smaller, the corolla-tube ventricose, and the sterile filament densely bearded. The plant is common not only near the seaboard, but also on the higher parts of the Cascade Range of Mountains, and occurs as far south as Mt. Shasta in Northern California. Allied to this, but probably quite district, is a plant exclusively Californian which I shall name provisionally

P. Davidsonii. A low semiherbaceous creeping undershrub, the proper stem subterranean mainly, and horizontal, rooting at the joints; the leafy and aerial branches often less than an inch, sometimes two inches high, very leafy at base only: leaves obovate and oval, obtuse or acutish, entire, veinless, only $\frac{1}{4}$ to $\frac{1}{3}$ inch long including the petiole, glabrous, not at all glaucous, light green even in the herbarium: peduncles leafy-bracted, glandular-hairy, 1 to 4-flowered: sepals lanceolate-acuminate: corolla 1 inch long, ventricose from near the tips of the sepals, the lobes rather short and not very unequal, the color lilac-purple: stamens woolly, included: sterile filament less than half as long as the others, strongly bearded at and near the apex.

Collected on Mt. Conness, at an altitude of 12,300 feet, 15 Aug., 1890, by Dr. George Davidson. The apparently insuperable obstacle to placing this under *P. Menziesii* is the fact that, instead of being a rigid cespitose shrub, its tough and almost herbaceous branching stems are underground, all

except the very short and strictly erect flowering branches. The foliage also is of another outline, is perfectly entire as well as glabrous, and does not in the least blacken in drying. It is a very beautiful alpine dwarf, the flowers usually exceeding in size all the rest of the plant that is above ground.

P. Newberryi, Gray, Pac. R. Rep. vi. 82. t. 14 (1857). In that complicated aggregate of Dr. Gray which he called *P. Menziesii*, even this was included, as a var. *Newberryi*, although it is an excellent species, exclusively Californian; but it is not, as he thought, the only Californian plant of this group. It is distinguishable most readily from the other members above described, by the brilliant carmine red of its corolla, the color of which Dr. Gray had been led to suppose was only "pink-red" or "rose-red." It is a many times larger plant, and has a much ampler and thinner foliage than *P. Menziesii*, and this is usually glabrous and sometimes glaucous. Moreover the corolla has a much narrower tube and throat than are seen in any of the foregoing, and the anthers are exserted. The slender raceme is peduncled, the peduncle bearing several pairs of bracts. The habitat of the species is alpine, near the line of permanent snow-drifts in the higher Sierra Nevada, from Mt. Shasta southward beyond the middle sections of the State.

P. Sonomensis, Greene, Pitt. ii. 218 (1891). So near is this to the last that its broader and often obcordate leaves, and quite sessile flower clusters are the only striking differences brought out by a comparison of the dried specimens; though the anthers are not exserted, and the corolla is less slender. It may also disclose some other differences of form when seen in the fresh state. But the habitat of this plant is very different from that of the other. It is neither alpine nor subalpine. The summit of Hood's Peak (in the Coast Range) seldom holds snow even in the winter months, while in summer it is dry and hot, like the summits of St. Helena, Diablo, and other peaks which rise up among the coast hills

and plains. There are few if any species common to the alpine heights of the Sierra and the dry summits of the Coast and Mt. Diablo Ranges; nor can there well be, since the two kinds of station represent climatological differences as great as subsist between the summit of Mt. Washington and the foothills of the Cumberland Range, or even greater.

A New Californian Moss.

By N. C. Kindberg.

Camptothecium alsioides, Kindberg, n. sp. Tufts large, bright green, shining. Stem long, creeping only at the base, regularly pinnate, often arcuate; branchlets obtusish, curved or sometimes straight when dry. Stem leaves broadly ovate-lanceolate, attenuate to the short and sharp acumen, faintly plicate in the lower part, margins revolute at base, plane below the middle, faintly denticulate toward the apex; cells long, nearly linear, except the numerous quadrate alar ones; costa thick, reaching to the more distinctly serrulate acumen; leaves of the branches from oblong- to linear-lanceolate, obtuse, more sharply serrulate; cells shorter, the upper sub-oblong, all the others, except the alar, oblong-lanceolate; perichætial leaves abruptly narrowed to a long subuliform denticulate and often deflexed acumen. Capsule subcylindric, curved, spreading or deflexed; teeth orange-color; segments yellow, lacunose in the middle; cilia two, nodose, not appendiculate, shorter than the segments; lid flat, apiculate; pedicel rough throughout, about 16 cm. long.

From the similar *C. Amesiæ*, Ren. & Card., this species differs in the obtuse branch leaves, the shorter and acuminate stem leaves, the longer pedicel of the capsule, and the shape of the lid. This, in *C. Amesiæ* (not found nor described by the authors) is obtusely conical. The new species resembles an *Alsia* in the peculiarly arcuate stems and branches. It was discovered by Mr. Marshall A. Howe, growing on rocks, at Mill Valley, Marin Co., California, 1892.

Studies in the Compositæ.

I.

About as natural a genus of Madioid Composites as we have in western North America, is that which in all our books goes by the name of *Layia*. The species number scarcely a dozen and a half, but exhibit much diversity in the characters of the pappus; and as the discovery of the leading types was made at a time very slight differences in the pappus were considered sufficient to establish genera, no less than eight genera were proposed almost within the first decade of the written history of these plants, each having some one or two of the species as its representative. The names proposed were as follows: *Blepharipappus* (Hook.), *Callichroa* (Fisch. & Mey.), *Oxyura* and *Madaroglossa* (DC.), *Eriopappus* (Arnott), *Layia* and *Calliglossa* (Hook. & Arn.), and *Calliachyris* (Torr. & Gray). Seven of these were proposed between the years 1833 and 1838. Asa Gray some years later added the eighth; and then, long afterwards, having by experience learned how little dependence could be placed upon the pappus here, merged the eight genera in one, and was followed by Bentham and Hooker. Dispensing himself from obedience to the law of priority, he chose for the genus, not the first, but the fourth or fifth of those published names; and that the only one of all the eight which had been employed before, and might therefore revert to another genus.

Some investigations made a year ago brought me to the conclusion that *Callichroa* must be received as the lawful name for the genus; and this I stated lately, on page 227 preceding. This was done too hastily; for I now discover that Sir William Hooker's type of his genus *Blepharipappus*

represents the genus now under consideration, and was published in 1833,[1] that is, two years prior to *Callichroa*.

Arnott, perceiving that Hooker's two species of *Blepharipappus* were really of two genera, separated them, proposing a new name, *Eriopappus*, but awkwardly, and indeed inadmissably, took Hooker's first species, or typical BLEPHARIPAPPUS, for the type of *Eriopappus*. This was done in the second edition of Lindley's Introduction (1836). Nuttall, in 1841, corrected all this; but of course, Asa Gray when his day came, stood by the error of Arnott, ignoring Nuttall's correction of it, and so we have *Blepharipappus* applied, in the Synoptical Flora, to a genus the lawful name of which is *Ptilonella*.

I subjoin an attempt to give the correct nomenclature of all the species known.

BLEPHARIPAPPUS.

Hooker, Fl. Bor.-Am. i. 316 (1833), excl. *B. scaber*. *Callichroa*, Fisch. & Mey. Ind. Sem. Petr. ii. 31 (1835). *Oxyura*. DC. in Lindl. Intr. 2 ed. 256 (1836). *Madaroglossa*, DC. Prodr. v. 694 (1836). *Eriopappus*. Arnott in Lindl. l. c. 443 (1836). *Calliglossa*, Hook. & Arn. Bot. Beech. 356 (1841). *Layia*, Hook. & Arn. l. c. 357, not of p. 182 (1841). *Calliachyris*, Torr. & Gray, Journ. Bost. Soc. v. 140 (1844).

* *Typical group; pappus-bristles plumose below the middle.*

1. B. GLANDULOSUS, Hook. l. c. (1833). *Layia glandulosa*. Hook. & Arn. Bot. Beech. 358 (1841). Species of the widest range, extending from the British to the Mexican boundaries of the Pacific side of the United States.

2. B. HETEROTRICHUS. *Madaroglossa heterotricha*. DC.

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[1] Although my own copy of the Flora Boreali-Americana, like every other which I have seen, bears on the title-page the date 1840, it is nevertheless certain that the first volume was finished and issued in 1833.

Prodr. v. 694 (1836). *Layia*, Hook. & Arn. (1841). Plains of the interior of California only.

3. B. GRAVEOLENS. *Layia graveolens*, Greene, Bull. Calif. Acad. i. 92 (1885). Mountains above Mohave Desert. California.

4. B. CARNOSUS. *Madaroglossa carnosa*, Nutt. Trans. Am. Phil. Soc. n. ser. vii. 393 (1841). A maritime species of western California.

5. B. ELEGANS. *Madaroglossa elegans*, Nutt. l. c.

6. B. HIERACIOIDES. *Madaroglossa hieracioides*, DC. Prodr. v. 694 (1836). This and the last are common in middle California.

7. B. GAILLARDIOIDES. *Tridax? gaillardioides*, Hook. & Arn. Bot. Beech. 148 (1840). Middle California.

8. B. HISPIDUS. *Layia hispida*, Greene, Pittonia, ii. 20 (1889). Higher elevations of the Mt. Diablo Range, and above the Mohave Desert.

* * CALLICHROA *type; pappus of naked bristles.*

9. B. PLATYGLOSSUS. *Callichroa platyglossa*, Fisch. & Mey. Ind. Sem. Petr. ii. 31 (1835). Abundant throughout almost the entire length of California toward the seaboard.

10. B. PENTACHÆTUS. *Layia pentachæta*, Gray, Pac. R. Rep. iv. 108. t. 16 (1857). Foothills of the Sierra Nevada.

* * * OXYURA *type; pappus paleaceous or none.*

11. B. OREGANUS. *Layia Douglasii*, Hook. & Arn. Bot. Beech. 358 (1841). Valley of the Columbia River, Oregon and Washington.

12. B. FREMONTI. *Calliachyris Fremonti*, Torr. & Gray.

Journ. Bost. Soc. v. 140 (1844). Interior of middle California.

13. B. JONESII. *Layia Jonesii*, Gray, Proc. Am. Acad. xix. 18 (1883). In San Luis Obispo Co., California.

14. B. NUTANS. *Callichroa nutans*, Greene, Pitt. ii. 227 (1892). Mountains of Sonoma Co.

15. B. CHRYSANTHEMOIDES. *Oxyura chrysanthemoides*, DC. Prodr. v. 693 (1836), not of Bot. Reg. t. 1850. Middle California toward the sea.

16. B. DOUGLASII. *Oxyura chrysanthemoides*, Lindl. Bot. Reg. t. 1850 (1836), not DC. *Calliglossa Douglasii*, Hook. & Arn. 356 (1841). Same range as the last.

PTILONELLA.

Nuttall, Trans. Am. Phil. Soc. n. ser. vii. 385 (1841); species associated with *Blepharipappus*, Hook. Fl. Bor.-Am. i. 316 (1833).

1. P. SCABRA, Nutt. l. c. *Blepharipappus scaber*, Hook. l. c. Common in Oregon and northern California, and running into two or three varieties or subspecies.

EREMINULA.

Dimeresia, Gray, Proc. Am. Acad. xxi. 411, and Syn. Fl. Suppl. 448 (1886), not of Labillardiere (1824). The derivative elements of Dr. Gray's *Dimeresia* had been brought into requisition repeatedly before, as the names *Dimeria* (R. Br.), *Dimesia* (Raf.), and *Dimetia* (Wight & Arnott) attest: but *Dimeresa* (Labill.) is to all intents and purposes of nomenclature the same as *Dimeresia;* and, while Bentham and Hooker suppressed the older genus, it was sustained by

authorities of equal eminence, and had been more than once named and defined as distinct from *Cupania*.

1. E. Howellii. *Dimeresia Howellii*, Gray, ll. cc. A depauperate Inuloid composite of a northwestern desert region.

Concerning Keteleeria Carrière, A Genus of Coniferæ.

By J. G. Lemmon.

Dr. Maxwell T. Masters, editor *Gardener's Chronicle*, London, in an article published April, 1886, reviewing several species of the genus *Abies*, describes anew from abundant data, the rare tree found by Mr. Fortune in China and named by Mr. Murray first in 1862 *Picea Fortunei*, and in 1863 *Abies Fortunei*. Certain characters are enumerated by Dr. Masters, viz.: "Cones erect (they are figured in his paper as arrect becoming erect), peduncled, thickly grouped and standing like rows of soldiers on the branches (hence they must be persistent from year to year), the scales are persistent," etc. The seeds are shown as devoid of resin vesicles and not at all covered on the inner surface by the recurved wing-base.

Dr. Masters also figures a section of the bark and states that "it is thick, spongy and at length cracked like the bark of the Cork Oak," adding the general statement, "Mr. Fortune speaks of it as a magnificent tree with the habit of a Cedar of Lebanon."

The description and figures show that this singular Chinese tree is no *Abies* at all but the type of a distinct genus. To crowd it into either *Picea* as Mr. Murray at first did or into *Abies* as he did a year later—followed now by Dr. Masters—requires important changes in the circumscription of two compact genera which as commonly received perfectly cover, each, a large number of species.

It seems to the writer unnecessary and unscientific to enlarge especially the compact and very natural genus *Abies* in so many important particulars, and it is to be regretted that so careful a writer as Dr. Masters did not give proper weight to the characters of this monotypic development as Carrière had done in 1862 when he named it *Keteleeria Fortunèi*--a name that should be restored. It should be added that *Keteleeria* differs as widely from every other known genus as it does from *Abies*.

Notes on Brodiæa and Fritillaria.

Since the publishing of *Brevoortia venusta* (see page 230 *supra*), I have received from the gentleman who sold the corms of that plant, the following instructive letter:—

Ukiah, California, 16 July, 1892.

Prof. E. L. Greene,

Dear Sir:—I have seen your descriptions of *Brevoortia venusta* and *Fritillaria recurva*, var. *coccinea*. The *Brevoortia venusta* I know well. It is a hybrid between *Brodiæa congesta* and *Brevoortia Ida Maia*. I entirely agree with you in thinking *Brodiæa*, *Brevoortia* and *Strophoirion* as constituting but one genus. This hybrid, your *Brevoortia venusta*, is a clinching proof of the close affinity subsisting between the species. I first heard of this plant some years ago, through Mr. J. H. Clarke, of Cahto, Mendocino County, who had observed that, where *Brevoortia* and *Brodiæa congesta* grew near each other, they occasionally crossed. A few years ago I found a few of the hybrids in my bulb beds, and ever since then they have occasionally appeared. In only one case have I seen more than a few together in a wild state. I am of the opinion that their seedlings tend to revert to one or the other of the parents.

In one other instance I have known distinct species of liliaceous plants to cross. Hybrids between *Calochortus Maweanus* and *C. pulchellus* are not rare; but they seem never to perfect any seed.

Your *Fritillaria recurva*, var. *coccinea* is a clearly marked species. It is common in Lake, Mendocino and Sonoma counties in certain places. I have it from Bartlett's Springs; also from several stations not far from Ukiah; and again, from Round Valley, fifty miles to the northward. Years ago I thought it new and sent it to Mr. Watson. He informed me that he considered it to be the typical *F. recurva;* then I concluded that plant of the Sierra, which we had always supposed to be the type, would have to be the variety. Outside of the points named in your description, the bulbs of the two are quite different. * * *

Yours truly,

CARL PURDY.

After all that Mr. Purdy adds to our knowledge of the *Fritillaria*, there remains no room for doubt as to its rank, and it will take the name FRITILLARIA COCCINEA. The late Mr. Watson was curiously in error when he supposed it to be the typical *F. recurva*, which species had its very name from the fact that its sepals and petals are abruptly recurved at the tips. No other *Fritillaria* bears that mark but the one of the Sierra Nevada; hence that must be the plant for which Bentham made the name. Nor is it in the least degree probable that he ever saw a specimen of *F. coccinea;* the country which it inhabits not having been entered by any botanist in his time.

Respecting the hybrid origin of BRODIÆA VENUSTA, I am not quite convinced that Messrs. Clarke and Purdy are correct. I should, at all events, need other evidence beyond the mere fact that the plant is found only where B. IDA MAIA (*Brevoortia Ida Maia*, Wood) and *B. congesta* grow together. It is characteristic of natural hybrids to differ greatly among themselves, some individuals bearing stronger resemblance to one of the parent species, others more like the other parent. Perhaps, however, some such variability as this is to be understood when Mr. Purdy speaks of a tendency in the seedlings to revert to one or the other parent species. But, beyond all this, I have an impression that the foliage of *B. venusta* is strikingly unlike that of either of the supposed

parents in one important point, that of color. In the garden bed where these plants grew with me, some growing leaves were remarked by me as being of a decided blue-green shade, which was a thing new to me in this genus, except in *B. capitata;* and, although the leaves were dead before the plants were in full flower, I believe it was the plants of glaucescent foliage which produced the flowers of *B. venusta.* I make this suggestion, and hope that Mr. Purdy may be able either to confirm or disprove the truth of it another season. If the plant in question be a hybrid it does most conclusively invalidate *Brevoortia*, a genus in which I have no longer any faith any way; though I am as firm as ever in the belief that *Brodiæa* and *Hookera* are distinct.

Some American Polemoniaceæ.

II.

In this article—a continuation of the subject from page 139 of the first volume—I propose the restoration of Mr. Bentham's genus Linanthus, to include several other allied groups of plants which, in the conventional floras and manuals of the time, are ranged under *Gilia.*

I have long been persuaded that one or the other of two methods of disposing of them, outside of *Gilia*, will have to be accepted. They must be received as forming a natural genus, intermediate between *Gilia* and *Phlox*, or they must be merged in the latter genus, for which they have decidedly a stronger affinity than for *Gilia.*

The only constant character by which they differ from *Phlox* is that of the equal insertion of their stamens. The corolla in very many species is just that of *Phlox*, while in others it is much more open, coming out, in some, to the open-campanulate or almost rotate. But, as I have remarked in

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the first of these articles, characters of the form of the corolla and insertion of stamens have so depreciated, in this family, in recent years, as more and more species have been discovered, that only upon habit, strengthened in four or five instances by some characters of the calyx, can any genera of *Polemoniaceæ* find confirmation.

After *Polemonium*, the type genus of the order, the best genera are *Phlox*, *Collomia*,[1] *Navarretia* and *Cantua*, each of which five has its own good calyx-character: but neither *Gilia* nor *Linanthus* displays a calyx essentially different from that of *Phlox*. *Linanthus* and *Phlox* are at agreement in habit, both having opposite leaves and a cymose inflorescence; moreover the flowers, and even the dead and dry as well as the fresh herbage, of both yield a certain peculiar fragrance of which there appears to be no trace in *Gilia*, *Navarretia* or *Polemonium*, many of the species of which are oily to the touch, and more or less strongly mephitic-scented, or otherwise unsavory.

The original LINANTHUS, with its habit, calyx, corolla, and impressive sweetness all as of a *Phlox*, when it was new must undoubtedly have passed to a place in that genus, but for the circumstance that its capsules contain very numerous small seeds; those of *Phlox* being filled with three large seeds. Yet some species which have always been admitted as congeneric with the type of *Linanthus*, have but two seeds, or even one only to each cell of the capsule. A more constant peculiarity of our *Linanthus* is, as I have said, the equal

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[1] *Collomia* rested formerly upon the unequal stamens, with unequal insertion. The total failure of this character was first indicated to Dr. Gray by myself; and, while I was hesitating about transferring the species to *Gilia*, that author took the responsibility, and made the transfers. Later, I discovered a new character for *Collomia*, and published it in Pittonia, i. 127. M. Baillon, who is the last of men to accept genera without characters, admits this one: and Professor Coulter in commenting on M. Baillon (Bot. Gaz. xvi. 183), says it is not clear to him how *Collomia* is kept distinct from *Gilia*. His herbarium specimens, if he has any fair ones, will show him, if he will but examine them in the light of all that has been said.

insertion of the stamens; but that signifies little; and we accept the genus reluctantly, and but to avoid the only rational alternative, which is that of merging the whole series in *Phlox*.

LINANTHUS is, of course, taken up as being the first of those several names that have been applied generically to any of the groups. It will be seen by reference to the place of original publication (Bot. Reg. xix. t. 1622) that it has precedence rather than priority over *Leptosiphon* and *Fenzlia*.

* *Dichotomous annuals; leaves opposite, linear, or with linear divisions; flowers solitary in the forks, and at the ends; corolla salverform.*—Typical LINANTHUS.

1. L. DICHOTOMUS, Benth., Bot. Reg. xix, under t. 1622 (1833). *Gilia dichotoma*, Benth., DC. Prodr. ix. 314 (1845). Erect, a few inches to a foot high, the nodes few and exceeding the leaves, these or their 3 to 5 segments linear-filiform, 1 inch long: flowers subsessile: calyx prismatic, scarious except the 5 prominent angles which are prolonged into acerose-linear recurved segments: corolla salverform, tube scarcely exserted, limb 1 to $1\frac{3}{4}$ inches broad, white, shaded on the outside with dark chocolate-color: stamens inserted below the middle of the throat, the base of each filament set within a nectariferous groove (as in certain Hydrophyllaceæ): anthers linear: cells of capsule 20 to 40-seeded: seeds roundish, with a loose arilliform coat, not mucilaginous when moistened.

Common throughout California, extending eastward into Arizona; the richly phlox-scented flowers appearing from February to May, according to the latitude.

2. L. BIGELOVII. *Gilia Bigelovii*, Gray, Proc. Am. Acad. viii. 265 (1870). Near the preceding, but smaller, with inconspicuous corolla, the lobes only 2 lines long and scarcely surpassing the calyx-teeth: anthers oval: seeds oval or oblong, with a close coat, mucilaginous under water.

From southeastern California eastward to the borders of Texas.

3. L. JONESII. *Gilia Jonesii*, Gray, Syn. Fl. Suppl. 407 (1886). More slender than either of the foregoing, the foliage almost capillary: calyx beset with stoutish stalked glands: corolla only $\frac{1}{4}$ inch long.

Colorado River, California, at The Needles.

* * *Less dichotomous; flowers sometimes crowded; corolla usually from funnelform to nearly rotate.* —

FENZLIA, etc., Benth.

4. L. DIANTHIFLORUS. *Fenzlia dianthiflora*, Benth. Bot. Reg. l. c. (1833). *Gilia dianthiflora*, Steud. Nom. (1840): *G. dianthoides*, Endl. *Fenzlia speciosa* and *concinna*, Nutt. Pl. Gamb. Branching from the base and the branches decumbent, or simple and erect, 2 to 6 inches high, more or less pubescent, leaves all simple, narrowly linear: corolla short-funnelform, 1 inch long or more, lilac with a darker or yellowish throat, the ample lobes from denticulate to strongly fringe-toothed: filaments inserted near the base of the tube: ovules 12 to 20 in each cell.

A common and very beautiful plant of southern California, the flowers very fragrant. Probably two or more good species are embraced under this name and too general description.

5. L. LINIFLORUS. *Gilia liniflora*, Benth. Bot. Reg. l. c. A foot high, slender, glabrous: leaf-segments about 3, filiform: flowers on long and slender pedicels in a loose cymose panicle: corolla with nearly obsolete tube, the limb rotate, $\frac{1}{2}$ to 1 inch broad, the obovate entire lobes white marked with 7 deep blue veinlets: stamens nearly as long as the corolla-lobes; filaments with a dense pilose ring just above the base, the very short corolla-tube below them pubescent: ovules 6 to 8 in each cell: seeds mucilaginous.

Common on plains and among the lower mountains throughout California; the large blue-streaked white corollas much like those of flax in appearance, beautiful but nearly scentless.

6. L. PHARNACEOIDES. *Gilia pharnaceoides*, Benth. l. c.;

Hook. Fl. Bor.-Am. ii. 74. t. 161 (1840). Smaller and more slender than the last, the corolla only a third as large and not rotate but campanulate-funnelform: filaments naked below, the throat merely puberulent.

From northern California to British Columbia, and eastward to the Rocky Mountains.

7. L. FILIPES. *Gilia filipes*, Benth. Pl. Hartw. 325 (1849): *G. pusilla* var. *Californica*, Gray, Syn. Fl. Slender, often diffuse, 4 to 10 inches high, scabrous-puberulent: pedicels elongated, filiform: calyx a line long, narrow-campanulate, hispidulous throughout, the subulate-acerose teeth little shorter than the tube: corolla pale purplish, 3½ lines long, the limb campanulate from a very short cylindrical tube: seeds about 8 in each cell of the capsule.

A delicate but pretty species of the plains and middle mountains of central California.

8. L. PUSILLUS. *Gilia pusilla*, Benth. Bot. Reg. l. c. (1833). More slender than the last, as large, less puberulent: pedicels capillary: calyx 1½ lines long, nearly cylindrical, 15-nerved, the scarious recesses of the tube not manifest, the broadly subulate teeth barely half as long as the tube, hispid-ciliolate: corolla short-funnelform, little if at all exceeding the calyx: seeds 3 or 4 in each cell.

Lower California and the islands adjacent; also in South America.

9. L. HARKNESSII. *Gilia Harknessii*, Curran, Bull. Calif. Acad. i. 12 (1884); Gray, Syn. Fl. Suppl. 407. Very slender, 3 to 10 inches high, nearly glabrous: pedicels capillary: corolla white, a line long or more, little exceeding the calyx: cells of the capsule 1-seeded: seed rather large.

Indigenous to the middle and higher Sierras of California, thence northward to Washington and eastward toward the Rocky Mountains.

10. L. BOLANDERI. *Gilia Bolanderi*, Gray, Proc. Am.

Acad. viii. 263 (1870). Slender as the three foregoing, differing from them all in a narrowly cylindraceous calyx and salverform corolla, the tube of which equals the calyx, the rotate limb being purplish and about 3 lines wide: seeds 2 to 5 in each cell.

Plains and lower mountains of central and northern California.

11. L. AMBIGUUS. *Gilia ambigua*, Rattan, Bot. Gaz. xi. 339 (1886). Stouter than the last; corolla much larger ($\frac{1}{2}$ inch long) and not strictly salverform, the slender tube little exserted, the obconical dark purple throat about as long as the rotate-spreading purplish lobes: seeds 2 in each cell.

At Oak Hill, four miles south of San Jose, California.

12. L. BELLUS. *Gilia bella*, Gray, Proc. Am. Acad. xx. 301 (1885); Syn. Fl. Suppl. 407. Slender but rather wiry, 2 to 4 inches high, the branches glabrous, floriferous near the summit: leaves only 2 or 3 lines long, villous at base: flowers nearly or quite sessile in the forks and upper axils: calyx-lobes strongly carinate, and hyaline-margined: corolla rotate-campanulate, the tube yellow, throat purple-spotted, limb $\frac{1}{2}$ inch broad, violet: filaments hairy at base: cells of capsule several-seeded.

Northern part of the Lower Californian Peninsula.

13. L. PARRYÆ. *Gilia Parryæ*, Gray, Proc. Am. Acad. xii. 76 (1876); Syn. Fl. ii. 137. Dwarf, pubescent, rather compact, and the flowers, all except the earliest, rather crowded, the whole plant $\frac{1}{2}$ to 2 inches high: leaves 5 to 7-parted, the acerose segments 2 or 3 lines long: calyx deeply cleft, the lobes lanceolate-subulate, the very short tube obconical: corolla white, lilac or yellowish, with very short tube, obconical throat, and obovate, entire or erose spreading lobes, the whole $\frac{1}{2}$ inch long, the throat below each lobe bearing a scale-like emarginate or obcordate appendage: capsule many-seeded: seeds angular, not mucilaginous.

From Kern Co., Calif., southward.

14. L. DEMISSUS. *Gilia demissa*, Gray, Proc. Am. Acad. viii. 263 (1870); Wheeler's Rep. t. 19. Near the last, but less pubescent, some of the leaves simple: calyx 5-parted: corolla smaller, with obovate obtuse lobes and a naked throat.

Southeastern California and adjacent Arizona.

15. L. AUREUS. *Gilia aurea*, Nutt. Pl. Gamb. 155. t. 12 (1848); Gray, Syn. Fl. ii. 138. Diffusely branched, 2 to 6 inches high: leaf-segments narrowly linear, 3 lines long, hispidulous: pedicels seldom longer than the flower: corolla open-funnelform, golden yellow, the rounded obovate widely spreading lobes about as long as the obconical throat and short tube: filaments inserted just below the sinuses, glabrous at base: seeds about 10 in each cell.

Southern California, and eastward to Texas.

16. L. LEMMONI. *Gilia Lemmoni*, Gray, Syn. Fl. ii. 394 (1878). A span high, widely branching, hirsutely pubescent: leaves shorter than the internodes: flowers solitary or few in each axil and subsessile, but at the ends of the branches more densely clustered: calyx turbinate-prismatic, strongly 5-costate: lobes acerose-subulate, equalling the throat of the yellowish short-funnelform corolla: capsule many-seeded.

Mountains of Kern Co., Calif., and southward.

17. L. RATTANI. *Gilia Rattani*, Gray, Syn. Fl. Suppl. 407 (1886). A span or two in height. erect, sparingly branched, puberulent above: flowers scattered on naked filiform elongated pedicels: corolla salverform, white or whitish with yellow throat; the slender tube a third to a half inch long.

Lake Co., Calif., Rattan. Suspected by Dr. Gray, as a possible hybrid.

* * * *Stem not dichotomous, the flowers corymbose-capitate at its summit; leaves palmatisect; corolla mostly salverform.*—LEPTOSIPHON, Benth.

+ *Corolla salverform, the slender tube long-exserted.*

18. L. ANDROSACEUS. *Leptosiphon androsaceus*, Benth. Bot. Reg. xix. under t. 1622 (1833), and Trans. Hort. Soc. viii. t. 18; Lindl. Bot. Reg. xx. t. 1710. Stoutish, 6 to 15 inches high, the internodes (about 4) elongated: lowest leaves 3-, uppermost 5 to 7-parted, the divisions oblanceolate, those of the floral subulate-lanceolate, all acute, rather strongly hispid-ciliate: corolla more than an inch long, the slender purple tube 9 or 10 lines, the short turbinate throat about a line long, very dark purple with a yellow border, the broad rounded or somewhat cuspidate segments lilac-purple (occasionally white), 3 or 4 lines long: style and filaments little surpassing the throat of the corolla.

Common in western California, but on wooded hillsides only; a well marked species, for this group, the flowers very large, always either lilac-purple or white, the throat of the corolla invariably purple in its lower part even in the albino state. The tube of the corolla is short in proportion to the size of the limb as compared with the next species; and this is almost the only point in Mr. Bentham's original character of the species which is at all helpful to the identification. The figures cited are, on the other hand, very unsatisfactory. Only the pale-blue flowered specimen of the group shown in the Horticultural Society Transactions seems to represent this species. The other two would more naturally be taken to represent the next.

19. L. PARVIFLORUS. *Leptosiphon parviflorus*, Benth. Bot. Reg. xix. l. c. *L. luteus*, Benth. l. c.? *Gilia micrantha*, Steud. Much more slender than the last, and scarcely as tall, the internodes as long, the leaves with narrower segments: tube of corolla very slender, 9 or 10 lines long; throat yellow; segments oval, 2 or 3 lines long, mostly pale yellow or white, tinged with red or brown on the outside: style and filaments half or more than half as long as the corolla-limb.

Abundant on exposed sunny slopes throughout the western part of the State, and in the foothills of the Sierra. The name *luteus* on Bentham's page has precedence over *parvi-*

florus; but I doubt whether that name may not be found to belong to the next; and from the description alone it is impossible to decide.

20. L. ACICULARIS. Only 3 to 6 inches high, very slender, more rigid and less pubescent than the last; the leaf-segments linear-acerose: corolla golden yellow throughout, the very slenderly filiform tube about thrice the length of the limb: stamens two-thirds the length of the obovate-lanceolate lobes; style short.

An exceedingly well marked species, growing with the preceding, but less common. Easily recognized by the stiff linear-acerose leaf-segments and slender bright yellow flowers. It is barely possible that Mr. Bentham's type specimens of *L. luteus* may be found to represent this species; though it is not probable; for he could hardly have overlooked so completely the real differences between this and *L. parviflorus*. It is for the same reason improbable that he had this in view as his *Gilia micrantha* var. *aurea* (Pl. Hartw. 325), to which he attributed no difference but that of the color of the corolla.

21. L. BREVICULUS. *Gilia breviculu*, Proc. Am. Acad. xii. 79 (1876). This rare plant of the Mohave Desert I have not seen.

22. L. ROSACEUS. *Leptosiphon parviflorus*, var. *rosaceus*, Hook. f. Bot. Mag. t. 5863 (1870). Commonly branching from the base and the branches decumbent, 3 to 5 inches high, stoutish and with short internodes, these 5 to 7, not twice the length of the leaves; segments of the lowest leaves obovate-spatulate, of the upper spatulate-linear, those of the floral bracts subulate, pungently acute, spinulose-serrulate above the middle, more softly ciliate toward the base: corolla an inch long, the tube and limb rose-red, the ample throat orange.

Common on the San Francisco peninsula, on open northward or westward slopes; not elsewhere detected. It is the most beautiful plant of the *Leptosiphon* group, and the spe-

cific characters are as good as are found in this subgenus. The orange color of the throat extends well up the base of the segments of the corolla, giving the flower the appearance of having a broader throat. The color of this part is constant in even the albino state of the species.

23. L. BICOLOR. *Leptosiphon bicolor*, Nutt. Pl. Gamb. & Proc. Philad. Acad. iv. 11 (1848). *Gilia tenella*, Benth. Pl. Hartw. 325 (1849). Very near the last, but dwarf (2 or 3 inches high); flowers rose-purple, the elongated corolla-tube $\frac{1}{2}$ to $\frac{3}{4}$ inch long and less slender than in *L. parviflorus* but the limb much smaller, only 2 or 3 lines broad.

Very common in the interior of California, from the foothills of the Mt. Diablo, northward, extending into Oregon.

24. L. CILIATUS. *Gilia ciliata*, Benth. Pl. Hartw. l. c. Rigid, strict, $\frac{1}{2}$ to 1 foot high, scabrous pubescent: internodes long: leaves with 5 to 9 linear rigidly ciliate segments: corolla rose-color, very small and slender, little longer than the floral leaves, the rotate limb only 2 lines broad.

Var. MONTANUS. Larger, with corolla an inch long, its throat funnelform, the limb 4 or 5 lines broad.

The type is very common in groves among the foothills of the Coast Range, perhaps chiefly on the Sacramento Valley side. The variety, very strongly marked as to its corolla, belongs to the Sierra Nevada at higher than middle elevations.

++*Corolla broadly funnelform above the short tube.*

25. L. GRANDIFLORUS. *Leptosiphon grandiflorus*, and probably also *L. densiflorus*, Benth. Bot. Reg. xix. l. c. Very rigid and strict, $\frac{1}{2}$ to $1\frac{1}{2}$ feet high, the rigid linear-subulate leaf-segments 5 to 11, ascending, spinulose-serrulate on the margin and toward the base somewhat ciliate: corolla lilac, the tube little exserted, the limb more than $\frac{1}{2}$ inch broad.

Said to be common toward the coast in middle California; but one seldom meets with it in recent years. Bentham's *L. densiflorus* was distinguished from his *grandiflorus* by having the tube of the corolla even shorter than the limb.

Teratological Notes.

I.

On the interesting subject of double flowers in a wild state I am not aware that any published records have been made in Pacific North America; which may be owing to the fact that we have never had a journal of botany on this side the continent; certainly it is not because instances of the reversion of stamens and pistils to petals have not been observed in indigenous species growing without cultivation. Mr. Charles T. Blake of Berkeley, who is a keen botanical observer, and has had many years of experience with Californian plants, assures me that in more than one instance he has seen Calochortus flowers as double as possible; and two years since, he brought to me, from near Webber Lake in the Sierra Nevada, a neat herbarium specimen of *Delphinium patens* in which the few flowers were as perfect rosettes of blue petals as are ever seen in the best double varieties of the old *D. Consolida*, or annual Larkspur of the gardens. To Miss Emma Harrison of San Francisco I am indebted for a good specimen of *Triteleia laxa* having each of the funnelform perianths filled with petals resultant from the transformation of the stamens and pistil into these organs.

The not very rare anomaly of a continuation of the growing axis through the center of a rose blossom took on a striking phase, this year, in my garden. The shrub producing the freak was of the double variety of the Cherokee Rose (*Rosa laevigata*, or *Sinica*), a hardy and vigorous climber. On a rapidly growing shoot which had developed in July, long after the flowering season of the species, and which was

partly shaded by a verandah under which it grew, I noticed one day what seemed like an unusually large flower in a very singular situation. Inspection revealed a whorl of about ten uncommonly large white petals encircling the shoot and forming a node, at the distance of nearly a yard below its growing apex. Subtending the lower whorl of petals, a set of five ligulate green bracts alternating with them appeared to represent the calyx; and about every third node of the leafy shoot beyond the flower bore a more or less distinct whorl of the ordinary quinate leaves in place of the usual solitary one.

In a single instance I have seen a plant of *Fragaria Californica* with all its flowers tetramerous; reminding one of the days of the great Linnæus and of the man who was so carried away with his own fancy of the importance this kind of difference in the numerical plan of flowers, that he separated from *Potentilla* the genus *Tormentilla* because its flowers were tetramerous rather than pentamerous.

Plantago lanceolata is becoming a bad weed in Californian fields, where at all seasons of the year, wet or dry, it maintains a hardy growth. Not rarely, after the early autumn rains or in early winter, such of the spikes of fruit as had but lately matured, put forth a tuft of green leaves at their summit, so that the spike itself suggests a diminutive pine-apple. I have not observed that this terminal leaf-tuft is ever destined to become a new plant by falling to the ground and taking root; a thing which, if it were to happen, would not be surprising.

Dr. Kuntze and His Reviewers.[1]

The more than eleven hundred learned pages upon plant naming which Dr. Otto Kuntze gave to the world seven months ago, we look upon as the most important contribution that has been made to the literature of this subject in the whole history of Botany.

This, I think, is a more favorable view of the merits of the work than any I have met with in the several reviews of it which I have read. Indeed the greater part of them have seemed almost wholly depreciative of these elaborate and very remarkable volumes.

While not finding myself at agreement with Dr. Kuntze in every particular, I am confident that some of the positions assumed by him on matters of nomenclature are both excellent and easily defensible; and I am as confident that at least a very large proportion of his new combinations, which men have so generally reprobated, will have to be accepted as the only valid names for the plants designated. I am therefore resolved to write a number of paragraphs in defense of the work, taking up as my line of action that of answering

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[1] *Revisio Generum Plantarum Vascularium omnium, atque Cellularum multarum, secundum Leges Nomenclaturæ Internationales,* * * * Mit Erläuterungen von Dr. Otto Kuntze, Wurtzburg, 1891.

Botanical Nomenclature. By Mr. W. B. Hemsley, in "Nature," xlv. 169. Dec. 24, 1891.

Notices of Books. By Mr. B. D. Jackson, in "Journal of Botany," xxx. 57. February, 1892.

Reviews of Foreign Literature. By Dr N. L. Britton, in "Bulletin of the Torrey Botanical Club," xix. 50. February, 1892.

Review of the "Revisio." By K. Schumann, in "Naturwissenschaftlichen Rundschau," vii. No. 13.

some of the points made, or thought to have been made by some of the reviewers. I seem invited to this course by the fact that more than one of the critics in Europe have taken occasion, under this caption, to animadvert upon some of my own views and methods in nomenclature; which was of course quite in place, inasmuch as I have sometimes stood in representation of principles espoused by Dr. Kuntze, and have advocated even a more radical treatment than his of the whole subject of the scientific naming of plants.

It would be impossible, within due limits, to go through the entire category of adverse comments passed on Dr. Kuntze's work within the last half year; and I am minded to take up only a few points in a few of the earlier and more extended reviews.

Mr. Hemsley begins his paper by a virtual denial of the existence of an international code such as that upon the authority of which Dr. Kuntze believes himself to have been warranted in the taking up and carrying on of his work. I do not purpose taking up any defense of the Laws of the Paris Congress of 1867 as of international binding force. Most botanists respect those laws as international, and claim to be working under the guidance of them more or less attentively and scrupulously; but we are not at this point to find fault with the Kew botanists, whom Mr. Hemsley represents. Seeing they declined to take part in the congress which adopted the Laws of Nomenclature, I rather admire the consistency with which they adhere to the stand they took at the time of the congress. It is small folk, not great, who can not afford to be consistent.

In order that his criticisms of Dr. Kuntze should be intelligible, Mr. Hemsley thought it desirable to give "a brief sketch of the recent history of plant naming." His attempt to sketch such history, from 1753 down to the present can hardly be called successful, I venture to think. To say that from 1753, when the first edition of the Species Plantarum was published, "down to within the last twenty-five or thirty years, matters proceeded with tolerable smoothness," is a

proposition which, to any one at all conversant with the history of the period embraced, will seem a surprising one to have been enunciated from so celebrated a seat of botanical learning as Kew. I can not even briefly answer Mr. Hemsley at this point without adverting to another very distinctly marked epoch, and a very great one too, in the history of plant naming. It is an era of less than fifty years' duration, but it is absolutely the only period in the history of plant naming in which matters proceeded with anything like smoothness. I refer to the splendid epoch which opened with Tournefort in 1694 and closed with Linnæus in 1735. It was an era which gave great things and great names to botanical science; first of all, a method of defining, delimiting and naturally arranging genera; and it was a time when botany attracted to itself the learning and the mental acumen of the ablest men of the day. Botanical exploration went on at a good rate both at home and abroad, and both new and elaborate local floras, and volumes of new genera and new species were put forth in rapid succession by men like Ray, Tournefort, Plumier, Vaillant, Dillenius, Boerhaave, Micheli, Haller, and many men of less note, though of sound learning and much force. These represent a time when men, particularly scholars, had a lively sense of justice, botanists universally respected the law of priority in nomenclature, and kept the law scrupulously. This was a period concerning which no man could write what Mr. Hemsley writes of the Linnæan epoch, that "some influential botanists did not scruple to ignore the published names of their contemporaries, or alter them upon the most trivial grounds; and there was almost universal laxity in citing authorities."

Now I wish to ask if this passage of Mr. Hemsley—good enough as descriptive of the times of the Linnæan supremacy—is at all congruous with that in which he represents matters as proceeding with tolerable smoothness? In his printed column they are the two parts of one sentence. At a time when men in the highest botanical station had no literary or scientific moral sense, and being themselves of mediocre

abilities in many cases, made up in part their own deficiencies by robbing of their genera and species men of talent in humbler station—at such a time our friend regards affairs botanical as gliding along smoothly enough.

The history of botany, in what we may call modern times, runs back through full four centuries. The happiest, smoothest period of its history, and at the same time an active and progressive one, was that intervening between the appearing of Tournefort's "Elemens" (1694) and Linnæus' "Systema" (1735). The most disturbed and contentious of all epochs—one not yet very near its end, we fear—was that inaugurated by Linnæus. Not one harmonious decade has this period known. The transition from the Tounefortian quiet to the Linnæan turmoil was abrupt. Linnæus, in the guise of a reformer, doubtless meaning to advance science, and meaning well at first, nevertheless almost outraged the feelings of the best men of his time when he rejected so large a proportion of those generic names which had been either created or adopted by the founder of scientific genera, Tournefort, or by that man's already revered pupils and other contemporaries. Nor was the plea of the exceeding inconvenience of all these changes omitted. The cry of "confusion," and the outcry against Linnæus as the author of it, appears fully to have equalled what we hear nowadays against Dr. Kuntze, and the "Neo-Americans." The cry of "confusion" ceased, after a time, though the confusion itself did not. Stroug protests against that extensive alteration of generic nomenclature of which Linnæus was the author continued to be made long after the publications of Siegesbeck, Mœhring, Ludwig and Heister; and the right of Tournefortian names to stand in place of their Linnæan substitutes was insisted on—more or less of them being restored in their books—by Adanson (1763), Crantz (1766), Philip Miller (1768), Scopoli (1772), Lamarck (1778), Gærtner (1788) and Mœnch (1794). All these gave more or less emphatic disapproval of the general course of matters in nomenclature, by reinstating pre-Linnæan genera and generic names, and giving the

species binary names under them. Nor did this kind of opposition to the general practice cease with the closing of the last century. As late as 1821, and in England (!) there was a botanist who dared at that period publish a flora from which not only the Linnæan classes and orders were rejected, but in which many pre-Linnæan generic names were maintained in the place of their Linnæan substitutes; nay, more than this, the author degrades here and there a Linnæan binary name to reinstate an older binomial of Ray! And this British Flora, despised altogether by the English "influential botanists" of the period, and consigned to an early obscurity, is now become the one British Flora that is in great demand wherever systematic botany is studied critically. I scarcely need mention the name of its author, Samuel Frederick Gray.

The discussions that have been held in continental Europe, and the still more recent suggestions that come from the far western part of North America, respecting the advisability of doing tardy justice to Tournefort and his contemporaries by restoring those generic names, of which Linnæus with the connivance of his adherents deprived them, need not here be introduced but by a bare mention; for they belong to "the last twenty-five or thirty years," a period excluded by Mr. Hemsley from his imagined era of smooth sailing.

The Linnæan system of nomenclature is based on no ethical principles at all; even justice, whose other name in science is priority, is at a discount here, and the motto of the system is success. Let his genus and species names stand who has the tact and the influence to keep them prominently before the botanical public. I am certain that this is true Linnæanism, and am ready to concede that the strong body of men whom Mr. Hemsley speaks for, are the most genuine Linnæans extant at this moment. They were never more discreet than when they resolved to have no part in the deliberations of the Paris Congress; for that was known to be a movement in favor of some settled principles—in a word, a movement for priority. But, so thoroughly wedded to the principle of success are the botanists at Kew, that they

promise to yield even to the principle of priority if its advocates "succeed in popularizing their ideas of 'right' and 'justice' in the matter." I am glad that at Kew they write so cautiously, and that Mr. Hemsley put those two words in quotation marks; otherwise, worthy men might have seemed to express an unwillingness to have anything to do in the work of establishing right and justice in their sphere, though willing to enjoy the peaceable fruits thereof, when perchance at some future day, these shall be ready to be gathered.

Mr. Jackson criticizes Dr. Kuntze, not as do others at Kew, for his vindication of the principle of priority, but as having taken "the date of issue of Linnæus' first edition of the Systema Naturæ, 1735, as his arbitrary starting-point." But no longer ago than 1887, Mr. Jackson himself announced that in his own revising of genera for the Index of Plant Names, he had taken the same work and date as his point from which to reckon priorities. "Our starting point, then," he tells us, "is the publication of Linnæus' of the Systema Naturæ, 1735."[1] There is a notable difference between Mr. Jackson's statement of his own case here, and his statement of that of Dr. Kuntze. He makes the Systema starting-point to have been taken by Dr. Kuntze "arbitrarily," while against his own taking up of the same point of departure he made no such accusation; and we can but wonder, and wish that we knew what Mr. Jackson's doctrine is. Could he name a starting-point which he would not consider arbitrarily chosen? He seems to hold the opinion still that there must be a starting-point, and even that 1753 is the proper date. But is this an "arbitrary" point of departure, or does he judge it to have been decided upon by some authority? Would he have blamed Dr. Kuntze, for instance, as taking his starting-point arbitrarily, in case he had made 1753 his date? What was the chain of circumstances—the category of experiences, by which Mr. Jack-

[1] Journal of Botany, xxv. 68.

son was induced to relinquish the 1735 date in favor of that of 1753? Did he, after working on that basis for six or seven years,[1] find the extraordinary amount of bibliographical research entailed by reckoning from the earlier date, an insuperable obstacle to his ever finishing the Index of Plant Names? Some sort of an explanation—perhaps amounting to an affirmative answer of my last question—is given by Mr. Hemsley, as if on Mr. Jackson's behalf, when he says: "It is no breach of confidence to say that Mr. Daydon Jackson, who has been engaged ten years on Darwin's Index to Plant Names, has come to the conclusion that any attempt to adopt genera of an earlier date [than 1753] will lead to hopeless confusion, to say nothing of inconvenience." If Mr. Jackson recognizes no authorized starting-point, and so concedes to every one the privilege of reasoning and selecting according to his own judgment, then this answer is measurably sufficient; though it leaves him in a position of injustice to Dr. Kuntze when he arraigns him as taking an "arbitrary" starting-point.

It ought here to be said in vindication of Dr. Kuntze that he does not regard himself as arbitrary in the selection of 1735 as the year from which to reckon genera. He professes to be conforming to "International Law;" and from this stand-point it seems to me clear enough without argument that if any general treatise of Linnæus is to be taken as initial for genera, it is quite inevitably to be the Systema of 1735; and it looks as if Mr. Jackson had seen this, and acted upon it up to a time when his reason may have become influenced unduly by the discovery of extremely formidable obstacles to the reforming of nomenclature with this date for a basis. We now understand something of the magnitude and multiplicity of the obstacles; but for the information we are indebted solely to Dr. Kuntze. Mr. Jackson did not stop to tell us, or even to give us a hint, until now the obstacles are at once revealed, and in large part removed, by Dr. Kuntze's work. But, to show how completely the Paris Code

[1] Five years had already been devoted to the work when, in 1887, the "1735" announcement was made.

points backward to the earliest of Linnæus' writings as our starting-point, let me quote here the essence of Article 15: which is to the effect that a genus "of plants can bear in science but one valid designation, namely, the most ancient, whether given or adopted by Linnæus or since his time." What this language gives to botany is, clearly enough, the most ancient names for genera which are found to have been in use, either by creation or adoption, without going back of Linnæus. I believe that most botanists of note have always so understood the article, and that none have interpreted it otherwise; but Dr. Kuntze has been the first, after all these years, to show us what is the real effect of this rule when adopted and lived up to in a scholarly way.

The Paris Congress was emphatically a movement for priority; and, as Linnæus had introduced an era in nomenclature, back of which it was not thought well to go, if they had named any one work of his as a starting-point, it would naturally have been that in which that author himself had least contemned the principle of priority. In his earliest general work, the Systema Naturæ, being himself young and doubtful of success, as well as also under the influence of sound principles inculcated by all his predecessors –in the Systema, and in that work only, did he seem to respect priority; and in that is to be found the greatest number of "most ancient names adopted by him." I repeat it; I can see no lawful escape from the Systema as the starting-point, if this rule of the Code be held as binding.

As a writer, Mr. Jackson is both clear and energetic: and. having denied to Dr. Kuntze the protection of any "International Law," and having placed him an arbitrary selecter of unfamiliar generic names, he would vanquish him with ease, if vigorous phrase could vanquish an opponent. "The folly. to use no harsher term. of raking up names given by Mœhring, or by Siegesbeck, in 1736, before Linnæus had had an opportunity to fully explain his system, or even to supply the requisite details, needs no enforcing; the case of Siegesbeck is particularly gross, he being Linnæus' most virulent oppo-

nent." The last clause reveals, what we fear has become habitual in the botanical mind in certain quarters, the working of a principle which it was to be hoped had been abandoned in England, after all the mischief it has wrought there; I mean that of suppressing one man's new genera, and giving them to another under other names, for the reason that he who had priority on his side, had the misfortune to be at variance with him who was assumed to be the man of greater consequence. But it is plain that the critic looks upon the case of Mœhring and Siegesbeck *versus* Linnæus as altogether exceptional; and where, if the same things had transpired before our eyes in modern times, all the blame would have been charged to Linnæus, Mr. Jackson finds no fault at all but on the other side; and their fault is that of not having regarded the youthful Linnæus of 1736 as a great oracle, in whose presence all other botanists must, for a time, remain speechless that he may perfect his great plans of reform! Surely Mr. Jackson's language amounts to the placing of Linnæus in a very peculiarly sacred position among botanists between the years 1735 and 1753. He makes it irregular, or at least futile, for any one to have proposed a new genus of plants, or to have done anything else except in the spirit of deference to Linnæus, or as tributary to his fame.

But the situation was not, we think, really so weak as to have called for so great sacrifice on the part of Linnæus' contemporaries, in order to the Linnæan success. *Systema Naturæ* is one of the most pretentious titles that a book of science ever bore. Nor would Linnæus have been likely himself to have acceded to such a proposition as that "the first edition of the *Systema* was an outline sketch only." But had it really been such how absurd would it not have been for Linnæus to have bidden botanists discontinue all research from the date of its appearing, lay down their pens and wait until, at the end of perhaps eighteen years, he should be able to set the crown on his own labors. And most unfortunately hard-pressed does the critic seem to be who must resort to such a supposition in order to dare denounce the restoration

of Mœhring's and Siegesbeck's good genera as a "foolish raking up of names." Linnæus' first edition of the Systema he meant as an important and finished work of its kind. To cut all expressions down to their lowest intelligible terms and to make a book that should be a success, was a part of his well contrived plan to gain ascendancy as a "reformer" of genera, and inventor of a new and curious system of classes of plants. One critic may no doubt say, if he will, that "Linnæus, as the inventor of the received nomenclature, had a perfectly free hand, and it is monstrous to think of imposing on him those restrictions which have become necessary since his time;" but another may as well and as safely say, first, that Linnæus invented absolutely nothing but a set of most artificially and empirically circumscribed plant orders and classes; and second, that it is monstrous to think of imposing upon the learned and venerable botanists of that time the obligation of sitting eighteen years in idleness and silence, waiting for the young iconoclast to have finished what they called his work of "confusion" before they published any more new genera of plants. Unless Mœhring and Siegesbeck and some even more able men of their time were under some such curious restriction, the genera which they published as new in 1736, have no other valid scientific designations at the present moment, than those they gave them.

With Mr. Jackson's disapproval of Dr. Kuntze's amendments of names, such as the changing of *Hondbessen* into *Hondbession*, and *Mokuf* into *Mokufua*, we agree thoroughly. The "Revisio Generum" doubtless loses some of its force through what seems to me the author's almost Linnæan wantonness of assumption along such lines. But I do not think that the matter of adopting, for example, *Tragacantha* in place of *Astragalus*, can in justice be relegated to the category of the "author's whims." It is a well grounded and long admitted rule—though with this as with rules in general, it happens that some ignore it—that precedence is the same as priority in the absence of literal priority; and *Tragacantha* has precedence over *Astragalus*, taking what

seems to be the legal starting-point under the Paris Code. Both names are equally ancient, and ancient in their present application also. Few perhaps care to know that *Astragalus* has precedence over *Tragacantha* with Tournefort.

Dr. Kuntze has assumed too many of the prerogatives of a bold reformer, no doubt; but in all his volumes one may not find an example of a certain kind of pure and transparently vacuous assumptions such as of which Mr. Jackson's half-dozen pages are prolific. Here is one: "Genera which have been set aside because of their obscurity, can not be revivified by any later study." In the abstract this is simply saying that a piece of identification which one man has undertaken and failed to make, can not be made by any one: or equally, that what an earlier generation has failed to make out, no subsequent one need undertake. But, according to Mr. Jackson, even if it were otherwise, and one futile effort in such a direction did not preclude a later, "no sensible person would wantonly inflict a wrong on the botanical commonwealth by ascertaining the genera of old authors; as it can only be of antiquarian interest." Here, in the first clause, it is made a wrong even to acquire a certain kind of knowledge, if its acquisition be possible. Is then the present state of botany so precarious that some kinds of knowledge must be absolutely avoided, lest wrong be inflicted on the science? This sounds like an echo of that proscription of research which men have said belonged to "dark ages." Nor is the second clause of the quotation more fortunate: knowledge of old authors in botany "can only be of antiquarian interest." I had always supposed that the antiquities of astronomy, for example, were of astronomical interest, and that the antiquities of another very old science, botany, were really of botanical interest. I can but wonder, after what Mr. Jackson here sets forth, if conforming to his proscriptive views, the great botanical libraries of London have lately made over to the antiquaries their hundreds of fine folios of the "old authors" in botany. If they heed this particular one of their botanical writers, that is what they must do; for it were waste of valuable space to

retain them where they were wont to be kept; and their presence where young botanists go, would remain a temptation to some to "inflict a wrong on the botanical commonwealth by ascertaining the genera of old authors"! Another phase of the critic's assumptiveness comes out where he argues that *Linnæa* ought to stand in place of the prior name *Obolaria* for this reason, among others, that the plant became the crest of Linnæus when he was ennobled, and is now the badge of the Linnæan Society of London.

I must allude, finally, to the critic's strictures upon my having "revived some of Rafinesque's forgotten or condemned genera." I do not think I have ever proposed the reinstatement of a "condemned" genus of Rafinesque, though I have restored to quite a number of long accepted genera their only valid designations, that is, the names imposed by him; names belonging to him, but of which he was deprived, at first, by the envy, the hatred or the malice of his contemporaries. But since at Kew they now and then perform the same kindly office, restoring the "forgotten or condemned genera" of Salisbury or of S. F. Gray, to the displacement of substitutes offered by Smith or Goodenough or Bentham, I claim immunity from their censure, at least in this. But when Mr. Jackson observes that "*Jacksonia* to supersede *Polanisia* does not greatly matter, for *Polanisia* is now sunk in *Cleome*," he is assuming the prerogatives of either an individual or insular absolutism. He seems to be saying that what they do in London is done; and that all else that happens in the small world botanical beyond shall count for nothing. "*Polanisia*" is well known by many botanists to be as good a genus as can be found in the family of plants to which it belongs.[1] I think no American botanist of any note, since Rafinesque proposed

[1] I do not find that the best character for JACKSONIA as contrasted with CLEOME has ever been indicated. In the former the valves of the capsule are persistent and remain united to near the summit, their tips then separating and becoming recurved! In *Cleome* the valves are not only deciduous, but separate from their axis from below, the tip being the last part to become detached.

the genus, has questioned its validity, or been able to admit that Mr. Bentham did well in remanding the species to *Cleome*. So while Mr. Jackson with such complacency pronounces the earliest of all Jacksonias a figment, we with a degree of equanimity express our own and some other people's opinion by writing it as an excellent genus.

The one review among all those read by me which is moderate in its censures, and duly appreciative of Dr. Kuntze's immense and richly valuable labors, is that of Dr. Britton of Columbia College; and this has been made elaborate to the extent of a long list of the American genera affected by the researches of the author of the "Revisio." This list will become one of the necessary adjuncts of critical work in nomenclature in our country. The reviewer has given many comments of his own at different places throughout the list, upon only a few of which would I make any remark.

The date of the first edition of Linnæus' "Genera Plantarum" (1737) is Dr. Britton's chosen starting-point; but whether he has ever considered the very extremely retroactive expressions of the Paris Code, and whether he holds the Code to be his law, I know not. He is struck with Dr. Kuntze's new method of using the parenthetic author-citation, namely, that of placing it after the name of the author of the combination rather than before it, and finds this practice inexplicable. It seems clear enough to me that by Dr. Kuntze's method a point in obedience to the International Law is gained; for that law demands, if I mistake not, that the name of the author of a combination shall follow the combination immediately. Unless one count a parenthesis as nothing at all—to which view, in my mind, little or no exception can be taken—the placing of it between the combination and the name of the author of the combination violates the Code.

In remarking upon the generic name *Bursa* as antedating *Capsella*, Dr. Britton says that the binary name for the common Shepherd's Purse becomes *Bursa pastoris;* to which I

assent; but I would ask how, upon his own principles, that can be, since he insists that every name used as a specific by Linnæus must be preserved in its integrity, even in the extreme case where the specific becomes a duplicate of the generic name. By the code of the ornithologists to which he has announced his full submission, the name of this weed must be *Bursa Bursa pastoris.*

Citing Dr. Kuntze's return to the primitive applications of *Erysimum*, *Nasturtium* and other names of cruciferous genera, his comments run thus: "The unnecessary mischief of going back to the Systema Plantarum of 1735 is well illustrated by these four citations. It overturns several hundred specific names in very closely related genera, and, as far as I can see, has absolutely nothing to be said in its favor" Well; the deed which had absolutely nothing to be said in its favor was that of Linnæus, when in 1737 he transposed all these four names, attaching each one to a genus which almost from time immemorial had been known by one of the other names. It was this wilful, presumptuous and wholly inexcusable transposing of names which made the better class of Linnæus' contemporaries in 1737 look on him with distrust. It was he who did the mischief; and Dr. Kuntze, by going back to 1735—the time when Linnæus himself had not ventured to remove the ancient landmarks nor dispossess these four genera of their right names by wanton transpositions—has simply been true to priority. This must be admitted as in favor of what he has done; while if his 1735 starting-point be the legal one, he has obeyed the law.

Mr. Jackson has well denounced as a "spurious priority" that with which Dr. Kuntze sometimes affects to invest subgeneric names by placing them on a level with the generic, degrading to the rank of synonyms the oldest generic names when they happen to be more recent than the sectional ones: and Dr. Britton, to my dismay, under *Spheroma* versus *Sphæralcea*, accedes to the proposition that this is wisely done. It is one of the grossest violations of the fundamental principle that an author must never make another say what

he has not said; and there is no plea that can excuse it. De Candolle in 1824 proposed no genus *Spharoma*, nor had he any such intention, and there is not the shadow of warrant or any one's saying that he did. The first man to call this group a genus appears to have been St. Hilaire; and he who gives his genus to another is chargeable with double injustice. He injures both De Candolle and St. Hilaire. He deprives both of them of certain rights, the latter of his genus and its name, the former of his right to call them, what he did call them, only so many species of *Malva*. I know it is assumed that this compelling a man to say "a genus" where he did not think there was more than a section is presumed to be a rewarding of his modesty. But it may be with modesty, as with other virtues, that it is its own reward. However that may be, the principle of representing an author as saying what he never did say is one of the most odious of literary vices. The plea of convenience is not often appealed to by me--the fundamental principles of justice and right always in the long run making for convenience in every way most thoroughly—but this work of deposing valid generic names in favor of the spurious priority of sectional ones, will create another upheaval in nomenclature scarcely second to this which Dr. Kuntze's principles have brought to pass; and we sincerely hope that Dr. Britton may reconsider this momentous question.

The long review with which Dr. Karl Schumann has honored his countryman's labor is considerate, and richly suggestive. He criticizes, first of all, Dr. Kuntze's strongly juristical basis of operation, deplores his having assailed some authors as bold appropriators of the results of others' labors, and adds that it is often very difficult to judge concerning an author's motives, and that in such matters it becomes one to proceed with the greatest carefulness and with the utmost reserve: all of which is well said. But still it remains, that flagrant injustices done by contemporary authors, one to

another, do warrant more than a suspicion of evil intent. Bad deeds are everywhere taken as evidence of bad motives. And many do not think it well to suppress upon all occasions a righteous indignation against such deeds; admitting, as I said, that one is bound to proceed with the greatest caution, where he has not positive evidence.

Dr. Schumann considers the "Laws of Nomenclature" very defective in that, having laid the greatest possible stress upon the principle of priority, they have named no one treatise as the point from which to reckon. He also concedes that proceeding upon the principle of justice alone, the starting-point for generic nomenclature could be none other than the great work of Tournefort. But, since the "Laws" forbid the going back of Linnæus, he thinks the congress should have named some particular one of that author's works as the point of departure. I, as I have said before, am of the opinion that the language of the "Laws" is clear and cogent upon this point, and that Dr. Kuntze, and even Mr. Daydon Jackson at the outset, gave the natural interpretation.

An admiral paragraph of this reviewer, in relation to uniformity in plant nomenclature, begins thus: "Doubtless the importance of an uniform nomenclature is greatly exaggerated. From a scientific point of view it makes no difference whether the Small-leaved Linden be spoken of as *Tilia parrifolia* or *T. ulmifolia*, or whether it be called by some Polish, Spanish or Arabic name, so long as one knows just what is spoken of." This is very much to the point. It is not the botanists after all, who so pedantically insist upon uniformity as the one great desideratum in nomenclature. It is the amateurs and the gardeners who can not abide it that a plant or tree should have two different names. I am here reminded of some passage in the writings of Baron von Mueller—who in his immense labors on the Australian flora has given more new names, and new combinations, than any other botanist ever did excepting Linnæus and Dr. Kuntze—to the effect that his new nomenclatures for extensive groups of plants are currently received with so much readiness that, within a year or

two after the making of a change, no inconvenience is felt, and no complaints are made.

Against the 1735 starting-point Dr. Schumann assumes the singular and surely untenable position that the work as regards genera, is a list of naked names of genera without diagnoses. He does not deny that equivalents are offered, nor question the fact that, in most cases if not in all, every body knew at the time and may now easily ascertain what plants were meant to be embraced by each generic name; so then his position is one of extreme pedantry. "All undiagnosed genera are with us simply *nomina nuda*, no matter whether by the citation of some figure, or by the adducing of some well known plant as the type of the genus, we are able to identify the genus or not," he says; and from this singularly arbitrary stand-point he concludes 1737, the date of the "Genera Plantarum," to be the right point of departure. Against that starting-point we have no more to say, but this reason for selecting it is an astonishing one. I think all systematic botanists of any experience know well that, while generic diagnoses are often the most crude, unsatisfactory, and even sometimes wholly impossible means of ascertaining what an author meant for his genus, the naming of a certain species as the type of it, usually leaves not the least room for uncertainty about it. Here I see the possible occasion for still another great revolution in nomenclature; and I earnestly hope no one may set about reforming generic names from this strange stand-point. It would be found the worst of all principles: and surely a great congress would need to be convened at the outset, not to determine the greatest number of syllables to be allowed in a generic name, but to settle far more grave and difficult questions, as, for example, what number of words, as a minimum, shall be necessary in the diagnosis of a genus, to render valid the name that may have been proposed for it.

In commenting upon the reviews. both of Mr. Hemsley and Mr. Jackson, I purposely omitted reference to what they had to say respecting the citing of ancient authors as sponsors for genera; though when the latter gentleman went to the length

of interdicting even the "ascertaining" of the genera of the ancients, I protested. Mr. Hemsley's sole comment upon my citing Catullus, Pliny and Theophrastus is an emphatic one, namely, an exclamation point. That is really very severe. But an answer to him, and to any others who are in elementary stages of acquaintance with these matters, was in print prior to his exclamation point. It begins at page 195 of this volume. But Dr. Scumann, who dwells in a country where men are permitted to "ascertain" if they will, the part that ancient authors really play in modern generic nomenclature, is also a little unfortunate in his allusion to "Americans" as the people "in whom dwells a sense of justice so delicate that they cite Ovid and Virgil." I have but a very brief though twofold reply to make this. I am the only American who has credited genera to classic Greek and Roman writers, in so far as my knowledge goes, and I shall be under obligations to Dr. Schumann if he will tell me where I have made Ovid the author of a genus. But the part of my answer which is especially pertinent to him, as being a German, is, that the valued handbook of references—the first volume one naturally takes up when wishing to begin the work of ascertaining who is the real author of a genus—is the German Sprengel's edition of Linnæus' Genera Plantarum. None but a German has, to my knowledge, been through the whole list of "Linnæus'" genera and given the true authors of them from Hippocrates and Theophrastus down to those who flourished in the thirtieth year of the nineteenth century; while among living authors who cite the ancients for classic genera (at least parenthetically), I may name, as being one of the most accomplished men who have served botanical science in the last half-century, Baron Ferdinand von Mueller, also a German, by birth and early training.

An unhappy feature of Dr. Kuntze's work, and one in vindication of which I can say nothing, is his method of constructing new names for genera. Perhaps in some distant century, when self-repeating history may have brought the return of the times when scientists were mostly men of clear

ethics, solid learning and refined tastes, some such reform in plant nomenclature as that which M. Saint-Lager in these times vainly advocates, will be carried into effect. If before the advent of that good time, Dr. Kuntze's *Radlkoferoloma* and *Schweinfurthafra* shall have become current for certain genera, they will be the first to be rejected. Certainly in the whole history of genera no other two such monstrously ugly appellations for plants have been invented; and many others constructed by him are little better. *Watsonamra* and its cognates are less objectionable, and would even have been quite tolerable if we could have been left to our own guessing as to their whole etymology. None would ever have been able to fathom that mystery, and in this there would have been something interesting. We therefore regret the author's having explained to us the fantastical origin of that *amra*. The information makes the names more positively obnoxious than they would have been. But *Watsonamra* has few if any chances of perpetuity, the genus of palms, *Serenoa*, apparently precluding it; for never yet has it been admitted that two generic names may stand in honor of the same man. For the same reason *Coulterina* of Dr. Kuntze is a mere synonym, as Dr. Britton has already indicated.[1] For the *Greenaea* of Dr. Kuntze there is a better prospect; because the *Greenella* of Dr. Gray is composed simply of some white-rayed species of the Willdenovian genus *Xanthocephalum*.

I scarcely meant, however, to write one sentence in depreciation of this work; for, in spite of its faults, the Revisio Generum of Dr. Kuntze both is, and is likely long to remain. the most important treatise extant upon the history and the whole literature of plant names; and the author has placed under profound obligations to himself every conscientious and careful botanist throughout the world.

[1] And similarly an inchoate *Coulterophytum* in Pringle's Mexican plants of 1891, should be withheld from publication. It is in no wise admissable.

New or Noteworthy Species.

XIII.

Micrampelis leptocarpa. Habit of *M. fabacea*, but more slender, with smaller and more deeply lobed foliage: leaves very thin, rather sparsely and delicately scabrous: flowers white, apparently open-campanulate rather than rotate; the staminate about 8 to 12 in a simple raceme; pistillate ones twice as large ($\frac{3}{4}$ inch broad), with oblong prickly ovary $\frac{1}{2}$ inch long or more: mature fruit rather narrowly oblong, acute, about 5 inches long, less than 2 inches thick, strongly armed with flattened prickles $\frac{1}{2}$ to 1 inch long: seed-cavities 2, each with perhaps 5 or 6 seeds, but these unknown.

This very distinct *Micrampelis* inhabits the Colorado Desert, in southern California, whence materials have been furnished by that zealous naturalist, Mr. W. G. Wright, of San Bernardino.

Xanthocephalum lucidum. Suffrutescent, the tufted stems slender, 1 foot high, diffusely cymose-paniculate above: linear-filiform foliage and very slender branchlets nearly or quite glabrous, very glutinous and of a light green: heads numerous, mostly glomerate at the ends of the twigs, clavate-cylindrical, little more than a line long, flowers of disk and ray mostly 1 each; bracts of involucre closely appressed: pappus of 4 or 5 acute scales.

In the region of the Mohave Desert, and southward. Referred by Dr. Gray to the Texan *Gutierrezia microcephala*.

Plagiobothrys campestris may replace the name *P. Californicus* of page 231 preceding; for a friend far away has called my attention to the *P. Californicus* of Bull. Calif. Acad. ii. 407, which I had forgotten.

PITTONIA.

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The Berlin Protest.

Two months ago I heard that a manifesto from the Berlin botanists, against the principles of Dr. Kuntze's "Revisio Generum" had reached America. No copy of this paper has yet arrived in California, notwithstanding that it was in this remote part of America that the present movement for priority in nomenclature took its rise, as far as America is concerned. The circular, whatever its title may be, would not have obtained any signatures in this quarter to be sure; but we were entitled to the sight of a copy of it, on general principles. Through the enterprise of the London Journal of Botany, a part, and presumably the most important part, of this document, has been given to English speaking botanists in a reprint. This reached our table just after the closing of the last issue of Pittonia; otherwise we should have given it immediate attention. The protest, so far as we have it, consists of four Articles, each supplemented by an explanatory Note.

The first Article defines as starting-points for generic and specific nomenclature, respectively, the years 1752 and 1753: that is, the fifth edition of the "Genera" and the first edition of the "Species" of Linnæus. Upon this proposition we have no comment to make beyond this, that 1752 is another choice of an arbitrary point of reckoning for generic priorities. But in the Note upon this Article I remark a surprising concession; namely, that "before 1752 the scientific position of Linnæus is not superior to that of Tournefort, Rivinus, and many other botanists, who had often described and segregated genera more exactly than he did." It hardly seems necessary to call attention to the wording of this, as being of

a character to interfere as little as possible after all, with the unfounded but long settled prejudice that Linnæus was the greatest of botanists. But the phrase of these learned men of Berlin does plainly enough—and in spite of the studied conservatism of their expression "not superior"—make him out scientifically *inferior* "to Tournefort, Rivinus and many other botanists" of pre-Linnæan times. It is one of the worthiest concessions made by a symposium of botanists in recent years; and the fact admitted is not without a strong bearing upon the whole controversy respecting starting-points for genera. I have often set forth the same view, but hitherto without an open second to my proposition.

The second Article of the protest relates only to the exclusion of *nomina nuda* and *seminuda*. A new name, without either diagnosis or known equivalent, is of course a thing of which no nomenclature can take cognizance, whether it be that of a genus or species; and such names ought never to be printed.[1] But the "*nomina seminuda*" of the German botanists, if I understand what they mean, are a very different matter indeed; and against the rejection of such, I would insist upon all I have said at page 279 preceding; and much more might be said. The term "*seminuda*" itself is a falsification if applied to new names with full equivalents given. The reference in most cases is clearly and distinctly made to a diagnosis somewhere already in print.

Proposition III is that "Similar names are to be retained ['conserved'] if they differ by ever so little in the last syllable." It is to be hoped that the authors themselves have seen, before this, how the very simplest rudiments of Latin grammar invalidate this proposition. The very first instance cited by them, that of *Adenia* and *Adenium*, is a case of the

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[1] Our British friends are doing well to continually inveigh against the printing of new *nomina nuda*. But American botanists keep up the practice. Even such strong advocates of good principles as the editors of Bulletin of the Torrey Club are still censurable on this score; see volume xix. p. 239 (Aug 1892), where the name of a new species is printed, the diagnosis promised for the future.

plural and the singular of the same name. According to these solemn pro*test*ants, the existence of a genus named *Populus* may not preclude the admission into the future category of accepted names that of a genus *Populi*. And also, since *Acnista* and *Acnistus*—masculine and feminine forms of the same name—are both to stand, these gentlemen would find no cause to exclude such generic names as *Ranuncula* and *Rhamna* would be, alongside of *Ranunculus* and *Rhamnus*. We are sorry to be compelled to believe that Messrs. Engler, Urban, and others, all of whom we profoundly respect, have drawn up these Articles in haste such as precluded, in some instances, the least philological reflection.

Article IV, the concluding one of what one may call the proposed Berlin Code, is a very momentous one in all which it contemplates. It is nothing less than an open proposal to overrule, in numerous and very clear cases, the fundamental principle of priority. It is said, by those who have been privileged to see the whole document, that a long list of genera is given, to all of which it is proposed to deny the right of priority, for the reason that they have been long under suppression; such as has often come to pass by the combined efforts of influential botanists to deprive of their rights certain less conspicuous authors. While from one point of view it is somewhat alarming to hear that a considerable number of able and very prominent German botanists have thus openly professed a virtual rejection of every ethical aspect of the situation, the frankness with which the position is taken tends to make it half-respectable. Their attitude is certainly an honest and honorable one when contrasted with that of many British and some noted American botanists, who, while professing to be guided in general by the principle of priority, scrupled not on any occasion to suppress the genus of an opponent in favor of the later one of some friend, nor hesitated to denounce other people's restorations of "forgotten" genera, while often practicing the same virtue themselves. The man who, adopting wrong principles, is open and aboveboard about it, has some title to respectful consideration.

Of course, our German brethren are seeking—nay, actually struggling—to evade the force of Dr. Otto Kuntze's great work, the importance of which we are sure we have not exaggerated in our commendation of it. The work is justly characterized as revolutionary, and it may prove to have marked an epoch in botanical nomenclature; and the incredible subterfuges that the most influential botanists are taking in efforts to elude the consequences of Dr. Kuntze's arguments are perhaps the strongest attestation of the merits of his book.

That in our own time there are many working botanists ready for the defense of priority from the stand-point of the ethical is certain. Dr. Kuntze's strong appeals to the principle of justice will have met with a hearty response in many places; and the almost utter abandonment of the ground of right and wrong, in relation to nomenclature, by those who have subscribed to the Berlin Protest will repel many, and must sooner or later react against all which this fourth proposition has in view. There is probably no stability for nomenclature upon this newly proposed basis, even if every botanist now living should subscribe to the four Articles; for the very next generation of botanists might from some source imbibe a love of justice, and undo all that we had done. The thought of a temporary disturbance, bringing some confusion, might not deter them, and should not deter us. But a very strong answer to this fourth Article, through one which makes appeal to the principle of priority without specific allusion to the ethical basis on which alone that principle ever obtained in the first place, is given editorially in a recent number of an American journal. It should by all means be read by every botanist, and to give it further currency I here repeat it:

"If all naturalists could be induced to agree to call Malveopsis Malvastrum or Spiesia Oxytropis, because these names are more familiar to the present generation and their retention would save labor and confusion, and if not only the present generation of naturalists, but their successors for all time, could be bound to adopt these names, then the plan would be an admirable one. But unfortunately the only way

to make nomenclature really stable is by an unfailing adherence to a rule. If one exception is admitted another will be, and as long as the human mind is active there will be botanists who will think that they can secure notoriety for themselves by changing names and by making other deviations. To prevent this and to make nomenclature stable, it seems to us that the law of priority must be maintained at any cost of labor and inconvenience, and that the longer its adoption is postponed by makeshifts like the one here suggested and by efforts to avoid meeting the issue squarely, the greater will be the ultimate confusion, and we deplore any effort to postpone changes of names which, sooner or later, are sure to be made, and every attempt to avoid compliance with the fundamental law on which scientific nomenclature is based[1]."

Studies in the Compositæ.

II.

Grindelia glutinosa (Cav.), Dunal, Mem. Mus. Par. v. 48. *Aster glutinosus*, Cav. Ic. ii. 53, t. 168 (1793). *Donia glutinosa*, R. Br. Kew, v. 82; Bot. Reg. iii. t. 187. Among the plants now received into the quite natural genus *Grindelia*, this species was the earliest to fall under the notice of botanists. Cavanilles published it as an *Aster*, from specimens grown in the botanical garden at Madrid a century ago, and gave "Mexico" as the country whence the seeds of it had come. Ten years later than 1793, the plant is said to have been cultivated in England by the celebrated Lambert: and he no doubt obtained the seed directly or indirectly from the original Madrid stock. The fullest description of the plant, and the only early figure, except the rather rude Cavanillesian

[1] Garden and Forest, v. 362.

engraving, are in the third volume of the Botanical Register (1817). Indeed, I am not aware of the existence of any other presumably good figure than this, which is by that fine botanical draftsman, Sydenham Edwards; and, since he drew from a living plant, and his figure is accompanied by a very minute description drawn up by Bellenden Ker, these data, along with the old garden specimens preserved in perhaps a few classical herbaria, will be the only means by which indigenous specimens—if ever they shall be found in any country—may be identified. The native country, of course, remains unknown; and some doubt has been thrown upon the Mexican habitat, by a passage of Bentham (Gen. Pl. ii. 250), to the effect that the seeds of the original came "from southern Peru, not from Mexico." The ground for this statement has not been shown; but the statement seems to have led Asa Gray to infer that perhaps the plant was derived from the coast of California, rather than from Peru, and so this author has given the species a place in the flora of North America,[1] taking as his Californian representatives of this obscure type, certain seaboard forms occurring between Humboldt Bay and the islands off Santa Barbara. It is nevertheless extremely improbable that any plant of California or any other part of this Continent, north of Mexico, can with reason be concluded to belong to *G. glutinosa*. In the first place the species was everywhere described as a shrubby or at least suffrutescent plant: but the suffrutescent Grindelias of California in nowise respond to the figures and descriptions of that species, nor were any of these at any time referred to *G. glutinosa* either by Nuttall, who alone knew them well, or by Gray, who dealt with herbarium specimens. They do not answer to it in foliage, flower or fruit. Secondly; the seaboard plants referred here by Gray, not only fail to show any of the essential characteristics of original *glutinosa* in leaf, flower, or fruit, but are strictly herbaceous perennials, and of low stature at that. The third strong presumption against the species having come from California lies in the fact that the plant was blooming in the

[1] Bot. Calif. i. 303; Syn. Fl. N. Am. 119.

Madrid garden before one Californian plant had been grown in Europe, unless this was such. It is true Hænke and also Neé were at Monterey in 1791; but the publication of plants from seeds collected by them does not appear to have begun until long after 1793; and I can find no evidence that anything of Californian botany was known in Spain at that date, though with Mexican and South American vegetation they were beginning to be well acquainted.

No Californian *Grindelia* has the obovate cuspidate subdecurrent foliage, or the short rays, or the numerous and barbellate slender pappus-bristles attributed to *G. glutinosa*. It should not, therefore, have been admitted into the descriptive botany of North America; and the well known Californian seaboard forms that have been thought to represent it here, seem to be mere varieties of two other species:

G. ROBUSTA, var. PLATYPHYLLA. Stems stout, ascending or erect, 6 to 18 inches long, leafy, corymbose at summit; leaves mostly broadly spatulate, obtuse, rather closely serrate, sessile by a broad auriculate-clasping base: heads very glutinous when young, the thinnish foliage not so: pappus bristles mostly 2 or 3 only, very stout, compressed, recurved, glabrous.

Common at Monterey, on bleak exposures near the sea. Good flowering specimens have been collected this year by Mr. Howe.

G. RUBRICAULIS, var. MARITIMA. Stouter than the type, depressed and more branching, the stems 8 to 16 inches long, often glabrous, seldom with a little of the pubescence of the type: leaves more numerous, of firmer texture and much broader, usually oblong or oblanceolate, coarsely serrate, sessile by a clasping base: pappus-bristles 2 to 5, stout, compressed, barbellate-scabrous on the margins.

Abundant on steep declivities almost overhanging the sea at Point Lobos, San Francisco, flowering late in summer (the type in spring or early summer); connected with true *G. rubricaulis*,[1] of districts more or less remote from the sea,

[1] This name antedates *G. hirsutula*, Hook. & Arn., for the same species.

by every gradation. The pubescence and the red stems, as well as the closely imbricated and not squarrose involucre, render this species easily distinguishable from *G. robusta.*

GRINDELIA PATENS. *G. hirsutula*, Gray, partly, not of H. & A. Stems stout, strictly erect, with a few terminal monocephalous branches, or simple: herbage not glutinous, neither villous nor hirsute but scabrous-pubescent, the growing parts more or less tomentose: leaves thinnish, narrowly oblanceolate, coarsely serrate: heads $\frac{1}{2}$ inch high or more, $\frac{1}{2}$ to 1 inch broad; bracts of the involucre mostly foliaceous and widely spreading, lanceolate or linear, occasionally narrower and smaller, with recurved tips: disk-achenes thin, obcordate at summit, striate, their pappus-bristles 2 only.

Frequent along the western base of the Oakland and Berkeley Hills; early-flowering and readily distinguishable from *G. rubricaulis* by its erect habit, the different pubescence, and by the very foliaceous-bracted and tomentulose but not glutinous involucre. This species was mentioned by me, without name, some years since, in Bot. Gaz. viii. 256.

GRINDELIA LANATA. Stem stout, erect, 2 or 3 feet high, reddish and, with the foliage and involucre, partly covered with a lanate white pubescence: lower cauline leaves narrowly spatulate or oblanceolate, sessile but scarcely clasping, entire or with few and coarse teeth; leaves of the corymbose branches entire, much broadest below the middle, where they are rather abruptly dilated to cordate-clasping base: heads rather small, subtended by two or three cordate-clasping bracts: involucral bracts linear-attenuate, tomentose, scarcely glutinous.

At Oak Bay, Vancouver Island, 18 June, 1887, John Macoun; the specimens distributed as *G. integrifolia*, DC., but lacking the resinous qualities of that species, and being pronouncedly lanate-hoary throughout. The floral leaves with their abruptly dilated cordate base, present a very striking outline.

Miscellaneous Notes.

By Marshall A. Howe.

Specimens of a *Fucus*, seemingly referable to *Fucus evanescens*, Ag. were found by the writer in the month of July at Pacific Grove, Monterey Co., Cal. It has not to our knowledge been before reported from the western coast of America, but has perhaps in some cases been passed by as *Fucus vesiculosus*, L., which species it resembles. It can be distinguished from the latter by the broader margin, the almost vanishing midrib, and the hermaphrodite conceptacles. In *F. vesiculosus*, L. the fronds are dicœcious.

A frond of *Gigartina radula*, Ag. was found at the same place, having tetrasporic sori borne on the papillæ. Harvey states (Nereis Boreali-Americana, Part II, p. 178) "Specimens bearing tetraspores are quite smooth, destitute of papillæ." *Gigartina microphylla* Harv., a closely related species, has the tetrasporic sori in the papillæ, but the frond in question has in other respects all the distinguishing marks of *G. radula.*

Specimens of *Agrostis alba* L. var. *vulgaris* Thurb. recently received from Newfane, Vt. bear glumes of four or five times the normal length. Some panicles show only a few of the long glumes, while in others the glumes are all of this abnormal size. In the latter case, the general appearance of the inflorescence is so altered that a plant of this kind was recently referred to another genus by a prominent American botanist. A microscopical examination of the ovaries shows them to be infected with nematode worms, perhaps of the genus *Heterodera*, and the unusual development of the glumes is probably due to their presence.

The Fruit of Garrya.

From what materials the descriptions of the fruit of the genus *Garrya* may have been drawn I am unable to say. Whether any of the pistillate shrub has been grown in Europe or not, I know not. Lindley in publishing the genus mentions only the staminate as having flowered in England in 1833[1]. But it is manifest both that his account of the fruit is very erroneous, and that with all its errors it has been copied by Endlicher, Bentham, and even by us Americans, Californians and all, down to the present time. The only species whose fruit I ever saw in abundance is *G. Wrightii* of New Mexico; but during the several years of my residence and travel within its habitat, I paid no attention to its fruit, taking it for granted that it was baccate as described. The type of the genus is *G. elliptica* of western California. It flowers in February, ripening its fruit in August; but until this year I had never seen the fruit. Only the staminate shrub is frequent in my neighborhood. For some good fruiting aments in their maturity, the first ever seen by me, I am indebted to the zeal of Mr. Frank Nutting, who brought them to me from near the summit of Mt. Tamalpais. The first glance at these clusters revealed the fact that the fruit is not baccate but capsular; and the capsule has a circumscissile dehiscence. In each ament, as the specimens lay before me, several of the globose fruits had already shed the upper hemisphere of their pericarp, while the lower one, remaining firmly attached to the axis of the ament, in some cases was already vacant, while in others the two large pulp-coated seeds occupied the base of

[1] Botanical Register, xx. t. 1686.

the cavity. The pulp investing the seeds is perhaps never, at any stage of the growth of the ovule, in contact with the wall of the ovary. The lining of the mature pericarp is glabrous and shining, though not of even surface, but rather irregularly scrobiculate. Though the two pulpy seed-lumps are suspended from the summit of that which eventually becomes the lid of the pyxis, they seem to part from their points of attachment before the falling away of the lid, and from that time lie in the bottom of the persistent half of the pericarp. The pulp of the seeds is of a deep coral-red, and has a rather keenly acidulous flower, mingled with a decided bitter. The circumscission of the capsule is neither very prompt, nor in a geometrically perfect circle; but if tardy, and slightly irregular, it is still an unimpeachably circumscissile dehiscence; and the fruit of this genus resembles quite closely that of *Celastrus* and its allies, in all but the direction of the dehiscence. It may also be compared with that of *Pittosporum*, with the same exception. It is in nowise like that of *Cornus*, and the genus ought doubtless to be excluded from the Cornaceæ. Lindley at the outset was of this opinion, and he proposed the ordinal name Garryaceæ for a family of which the several species of *Garrya* are still the only known representatives.

New or Noteworthy Species.

XIV.

LOTUS SULPHUREUS. Suffrutescent at the very base, the slender branches 1 or 2 feet long, only sparsely leafy, floriferous chiefly near the ends: herbage canescent with an appressed silky pubescence: leaflets 3 to 5, cuneate-obovate, obtuse or acutish, 2 to 4 lines long: umbel unifoliolate-bracted, many-flowered, on a slender peduncle about an inch

long, exceeding the leaves: calyx a line long, the slender teeth ½ line: corolla twice the length of the calyx, sulphur-yellow (deep red when withered in age): pod strougly arcuate, the slender beak equalling the body, this 1-seeded.

On Wilson's Peak, Los Angeles Co., California; collected by my very good correspondent, Dr. Anstruther Davidson of Los Angeles; date August, 1892. A species related to *L. Nevadensis*, but very unlike it in habit, pubescence, inflorescence and color of flowers.

HEDYSARUM MACKENZII, var. LEUCANTHUM. Subacaulescent, scarcely a foot high: racemes short, few-flowered: flowers large, pure white.

On the Porcupine River, northern Alaska, Mr. J. H. Turner. Far more than an albino state of *H. Mackenzii;* perhaps identical with some Asiatic species; but the plants were just coming into flower when gathered, so that there is no trace of the loment.

CLAYTONIA NUBIGENA. Annual, with the habit of *C. perfoliata*, but only a third or a fourth as large, the herbage pale and glaucescent, the white or pinkish flowers twice as large: leaves all linear; involucre orbicular.

On the highest summits of western Californian mountains, Tamalpais (Jepson), Mt. Diablo and Mt. Hamilton (Greene): the species no doubt heretofore confused with the smaller forms of *C. perfoliata angustifolia*, Greene. It is intermediate in character between two such very distinct species as *C. perfoliata* and *gypsophiloides*, exhibiting the general morphology of the former, but with a glaucescent herbage which brings it near the latter. But in its habitat it is not intermediate between them; for it seems confined to the summits of our highest middle Californian mountains. The belt of *C. gypsophiloides* is well marked, and about midway between the base and summit of such mountains, while *C. perfoliata* is of the plains and foothills only. The three species nowhere infringe upon each other's territory.

ERIOGONUM TAXIFOLIUM, Greene, Pitt. i. 267. A much larger and almost heath-like shrubby plant, copiously floriferous, collected by Mr. Dunn, at Fish's ranch, San Diego Co., Calif., Sept. 8, 1890, I take to be specifically identical with the starved and inconspicuous plant from Cedros Island to which I gave the above name. It is possible that this form from San Diego Co. may have been made a part of the unhappily confused *E. Wrightii* of the Botany of the State Survey. It is also to be remarked that if Dr. Torrey's *E. trachygonum* and *Wrightii* be not admitted as distinct, it is the former name which must be retained, as having the precedence.

ERIOGONUM DAVIDSONII. Annual, slender, erect, about a foot high: leaves in a rosulate tuft at base of stem, round-obovate to subreniform, abruptly narrowed to a long stoutish channelled petiole, densely lanate-tomentose on both faces, but especially beneath: stem glabrous and glaucescent throughout, parted below the middle into few and slender virgate branches: involucres sessile along the branches, remote, rather few-flowered and narrow, turbinate or almost prismatic, a line long, rather prominently 5-toothed: perianth pinkish or white, $\frac{3}{4}$ line long; outer sepals spatulate-obovate, the inner narrower, all more or less retuse.

Mountains of Los Angeles and San Diego counties, California; the type specimens from Wilson Creek. Dr. A. Davidson. Other specimens have been in my herbarium for some years, and with much reluctance allowed to remain with those of *E. gracile*, to which the species is more related, perhaps, than to any other; though the plant looks like what a small and annual state of *E. nudum* might be if there were such a form.

EPILOBIUM SUBCÆSIUM. *E. Oregonum*, Greene, Pitt. i. 225, not *E. Oregonense*, Hausskn. The earlier publication of Dr. Haussknechts' homonym calls for the change thus suggested in the case of my former *E. Oregonum*. My friend Prof.

Trelease seems to have escaped the responsibility of changing the name, by assuming a heavier one, *i. e.*, that of virtually suppressing the species by guessing it a mere hybrid; but he has not supported that rather gratuitous proposition by any facts; and, what is still more strange, he has quite gravely misrepresented my species by figuring for it a widely different plant which he found in another herbarium than mine; all of which may be accounted for in some manner, no doubt, though one can not see how, when it is known my type specimens were in his hands, and there was nought to hinder the figuring from them.

EPILOBIUM MINUTUM, Lindl. var. BIOLETTII. Very slender, nearly or quite erect and only sparingly branching, 1 to 1½ feet high: corolla very minute (not so in the type): pods on very slender pedicels 1½ or 2 lines long: seeds minute, clavate-obovate, very distinctly papillose-granulate.

Collected beyond Mill Valley, southern slope of Mt. Tamalpais, May, 1892, by Mr. Bioletti. It seems probable that more than two good varieties or subspecies are embraced under *E. minutum* as now received. In what we take to be the type, the seeds are twice as large as in the present plant, and perfectly smooth, as well as of a different outline. Mr. Bioletti's plant is remarkable for its tall growth, slender habit, and very conspicuously slender-pedicellate nearly straight capsules. These in the type are subsessile and strongly incurved (not "recurved" as said in the original specific character).

RANUNCULUS TURNERI. Stems stoutish, erect, 1 or 2 feet high, from a fascicle of fleshy-fibrous roots: petioles and lower part of stem more or less hirsute: leaves broader than long, the radical on long petioles, 3-parted, the lateral lobes bifid, all incisely cleft: sepals 5, oblong-lanceolate, hirsute, spreading (not reflexed) under the petals: corolla very large (more than an inch broad), the 5 yellow petals broadly obovate, very obtuse: pistils with long circinate styles.

But for the firm, spreading and rather persistent sepals, this handsome buttercup, in the absence of mature fruit, would perchance have passed for a rank northern *R. Nelsonii*. As it is, there is no described species, to which it can at all be referred; and we are glad to be able to dedicate so fine a new plant to the gentleman who has given the very best of recent contributions to our knowledge of Alaskan vegetation, Mr. J. H. Turner, who brings it from Porcupine River.

SAMBUCUS MARITIMA. *S. callicarpa*, Greene, Fl. Fr. 342 (1892), partly. Arborescent, 10 to 25 feet high, the trunk somewhat flaky rather than with close and firm fissured bark: pith of shoots white: young twigs and leaves pubescent with retrorse hairs: young leaves with small ligulate callous-tipped stipules: cymes small, dense, flat-topped; corolla rotate, white: fruit dark purple with a reddish tinge, slightly glaucous.

Though I named as the type of my *S. callicarpa* the beautiful scarlet-berried elder common in California, and called *S. racemosa* in the State Survey Botany, the description of the trunk, foliage, etc. was drawn from fresh specimens of a tree which now proves, by its mature fruit, to be a wholly distinct and new species. Said trees, which by their early flowering and general resemblance to the red-berried species, I had always supposed to be that, had always interested me deeply by their strangely maritime habitat. They stand at only a few rods distance from a sand-beach of San Francisco Bay; and that in a depression which can not more than equal the level of the salt water at less than the highest tide. Almost underneath the trees grow great quantities of *Potentilla Anserina* and other plants of brackish marshes. This habitat had not failed to impress me; because the usual locations for the early and red-berried elders are grounds among the wooded hills, or at least along the banks of mountain streams well above the high water mark. Still it was with some surprise that I discovered lately small clusters of purple berries on this maritime shrub, which I had so long

mistaken for one of the scarlet-berried sorts. By its early flowering, and other peculiarities, it is clearly of that group which embraces *D. racemosa, callicarpa* and *melanocarpa*. That the American *S. pubens* is distinct from *racemosa* I indicated in the Flora Franciscana.

HABENARIA MARITIMA. Very robust, only 6 to 16 inches high, at flowering time destitute of foliage, but the upper part of the stem bearing many lanceolate-subulate appressed and more or less imbricated green bracts $\frac{1}{2}$ inch long or more: spike $1\frac{1}{2}$ to 3 inches long, 1 inch thick, the flowers closely crowded, white, heavily honey-scented: sepals oblong, obtuse, $1\frac{1}{2}$ lines long, white, with a narrow and delicate deep-green midvein: petals not quite equalling the sepals, oblong-lanceolate, the upper 2 plane, deep-green at base and well up the middle, otherwise white, the lip pure white even to the prominently elevated and broad midvein: spur slender, longer than the ovary.

On dry hills near the sea at Point Lobos, near San Francisco, flowering from August to October; leaves probably appearing in early spring and soon dying. Species apparently referred to *H. leucostachys* in the State Survey Botany, but most distinct.

THE GENUS KUNZIA.

A well known Rosaceous type of Rocky Mountain and Californian shrubs, at first referred to the South American genus *Tigarea*, was taken up by the elder De Candolle in 1818, as a new genus, under the name of *Purshia*. Sprengel, who, about a year earlier, had himself published a genus *Purshia*, soon after proposed *Kunzia* for the name of the Candollean *Purshia;* and this will apparently be the proper name for western genus now called *Purshia*, which latter

name is more than once revertible; for Rafinesque had a *Purshia* in print as early as 1813. I find no record of any earlier KUNZIA than this of Sprengel, which most writers who have mentioned it say was substituted for the Candollean *Purshia* in Sprengel's Systema, 1825; but I find it four years earlier than that, in the first edition of Steudel's Nomenclator (1821). The known species are two, and their names will stand as follows.

K. TRIDENTA, Spreng.; Steud. Nom. i. 669 (1821); Spreng. Syst. ii. 475 (1825). *Tigarea tridentata*, Pursh. Fl. i. 333. t. 15 (1814).

K. GLANDULOSA. *Purshia glandulosa*, Curran, Bull. Calif. Acad. i. 153 (1885); Greene, Fl. Fr. 59, with fuller diagnosis than the original one by Mrs. Curran.

TERATOLOGICAL NOTES.

II.

In the summer of 1889, while botanizing about Lake Pend d'Oreille in northern Idaho, where the wild red cherry, *Cerasus mollis*, Dougl. is common, I found a thrifty young tree of this species well laden with ripe fruit, upon the boughs of which I noted many instances of a double drupe, or rather of two distinct drupes produced from a single flower. In other words, many of the flowers of this tree must have been furnished with two distinct pistils, each of which attained maturity. With the exception of one shrub, well known to most botanists of the Pacific Coast, *Osmaronia cerasiformis* (T. & G.), Greene. all flowers of the Drupaceæ are normally monogynous and produce but a solitary drupe; but *Osmaronia* has about five pistils to the flower, one or more of these

nsually aborting, so that the drupes are apt to be but three or four to a pedicel. Apart from this pentagyny *Osmaronia* is naturally not much better, as a genus, than a diœcious cherry, or *Cerasus*. And this thought is emphasized in our mind by the occurrence of the double-druped red cherry which I have now recorded. The duplication or even further multiplication of pistils in Drupaceæ is a phase perhaps peculiar to those of Pacific North America. But I have to mention now the same thing as occurring in even the Peach Tree, as cultivated in California. Last April, while inspecting a young peach orchard belonging to a friend, I noticed on one tree a very great number newly set fruits numbering two, three, and even four to the pedicel, showing that many a flower had had just so many pistils. The young fruits at the time were of the size of large peas, and gave promise of attaining maturity, even where they were four to the flower. Being much interested in this freak, I have made enquiry among other peach growers about this matter, and am told that in California it is no great rarity. One person informed me that he had dug up and destroyed young peach trees otherwise perfect, for the sole reason that, producing their fruits in pairs and threes to each flower, these in their maturity were reduced in size and crowded out of shape by mutual pressure, so as to be unfit for the market.

Two queries now arise. Is this multiplication of pistils in the peach peculiar to the Pacific Coast? And, if so, is it another of that class of facts which our friends the evolutionists press into service, as indicating that species, and even genera, are created by soil, climate, or in one oft-repeated word, "environment"?

Diagnoses of Two New Genera.

HESPERALCEA, of the Malvaceæ.

Sidalcea § *Hesperalcea*, Greene, Fl. Fr. 106 (1891).

Stout and tall perennial, leafy and hispidulous, with ample angular foliage, and unisexual flowers in short and dense paniculed spikes. Involucels 0. Stamineal column double; filaments of the outer series more or less united into sets. Style branches stigmatic lengthwise. Carpels 1-seeded but apparently dehiscent by a dorsal suture. Cotyledons round-ovate, not in the least cordate.

Wholly incongruous with *Malva*, *Sidalcea*, etc., as to habit and aspect, its cotyledons as they appear in seeding plants now growing under my inspection, prove this *sui generis*. These organs, in all the genera closely allied to *Malva* have one peculiar cut, the distinguishing feature of which is their very neatly cordate-rounded lobes at the base. In this type these are not even so much as truncate at base, but are narrowed, though very abruptly, to the petiolule. The species is but one, namely,

H. MALACHROIDES. *Malva malachroides*, H. & A. Bot. Beech. 326 (1840). *Sidalcea malachroides*, Gray, Proc. Am. Acad. vii. 332 (1868).

RAMONA, of the Labiatæ.

Greene, Pittonia, ii. 235 (1892). Species of *Audibertia*. Benth.

Suffrutescent; the stout subterete branches very leafy; the leaves opposite, of obvolute vernation. Flowering stems scapiform, far exceeding the leafy branches (4 to 8 feet high).

paniculately branching, the verticillasters forming unilateral racemes. Bracts and floral bractlets small, reflexed, cuspidate-tipped. Calyx and corolla strongly bilabiate, the latter with slender tube, almost obsolete upper lip, the lower lip greatly elongated (a half-inch long), narrowed at base, abruptly constricted in the middle, folded abruptly backward over the upper lip and the tube, concealing both. Filaments dilated, inserted on the middle of the lower section of the lip; antheriferous connective of each elongated and exserted, extending backward toward the calyx by inversion of the corolla-lobe bearing it; sterile connective greatly reduced, appearing as a prominent tooth. Style slender, long-exserted, bent abruptly to one side near the base, and protruding laterally from the corolla at almost a right angle.

That the very odd and highly complicated structure of the flower in this common plant should never have been made out even approximately by any of the masters of herbarium work, is evidence of the insufficiency of the data which such materials furnish, where accurate knowledge of these organs is needful to determine affinities. There is no *Salvia* or *Audibertia* which makes the slightest approach to *Ramona* in the cut of the corolla. Its lower lip is not only thrice the length of all the rest of the flower, but is fiddle-shaped, the two lobes of this body being folded first downwardly the upper upon the lower one, and then the whole body, thus doubled, is laid back over the tube, throwing the long-exserted stamens (whose foothold is upon one of these lobes) backward so that their anther cells lie down toward the orifice of the calyx; and then the style, coming out at one side of the closed orifice of the corolla, is bent squarely about in order that the stigma may be near the anther-cells. The one species is

R. POLYSTACHYA (Benth.), Greene, l. c.

New Californian Atriplices.

By Willis L. Jepson.

The fertile plains of the Lower Sacramento Valley lying near the base of the first bordering wall of the Coast Range would hardly be named as a promising locality in which to search for new species of Atriplex. They are plants of the sea-shore, of brackish marshes, of the alkaline valleys and desert plains of southern California and the great interior. The Sacramento Valley—a region two hundred miles long and sixty wide—has only been credited in the volumes and papers of systematic botany with one species of the genus.

The outlook is not inviting on the scorched plains at the season when these plants flourish; there is little to be seen of native growth but dry grass, dead winter annuals and bunches of Grindelia. But narrow strips of alkaline soil run across the plains, and although covered for the most part by deposits of rich soil from the adjacent mountain range, patches of small extent appear every half-mile or mile and are lower than the surrounding country. Here grow Atriplices. The locality as far as natural conditions go is favorable to their growth, and from such a station come four of the five species described in this paper. The other is from the Montezuma Hills along the Suisun Bay shore at Collinsville. I think they may prove endemic in the valley of the Sacramento, and are only likely to be rediscovered in similar soils to the northward of these known stations.

It need not be remarked upon as strange that they cannot be identified with species of the Mohave Desert region or of Arizona or New Mexico. They are not migratory plants;

they grow only in peculiar soils which are for the most part limited in extent. It is as impossible for them to cross a level alluvial plain as a mountain range of five thousand feet. Their seeds are very unlikely to be transported by the agency of man and being transported are the least likely of all plants to fall in that peculiar kind of saline soil which they favor.

There is slight resemblance among any of these new species —least of all in habit. The one character which they possess in common is that they are monœcious; two are constantly androgynous.

ATRIPLEX DEPRESSA. A prostrate, grayish-scurfy annual with slender stems 1 to 4 inches long, decussately branched throughout; leaves opposite, sessile, broadly ovate, acute, a line or two long; flowers in the axils of the opposite leaves in clusters of four—these and the subtending leaves crowded on the branchlets, the internodes at time of flowering a line long or less; fruiting bracts ovate-hastate, acute, wingless, or the pair of hastate lobes representing the wing.

This species stands quite alone in Atriplex as far as habit goes. It is distinguished by its leaves which are opposite not only below but even to the very ends of the branches. It is also remarkable for its decussate branching, its small size and prostrate habit. The inflorescence is androgynous, commonly two staminate calyces and two pistillate bracts in each cluster. The bracts are completely united over the utricle seldom partially distinct even at the apex. In low saline spots, at the base of the Pelevo Hills, west of Vanden, Sept. 22, 1891.

A. CORDULATA. Annual; eight to fifteen inches high, widely and oppositely branched at the base, alternately and sparingly so above; herbage scurfy throughout; leaves sessile, cordate-ovate, three or sometimes four lines long: flower-clusters in all the axils; calyx tomentosely scurfy and deeply 4-cleft; fruiting bracts semi-orbicular, 1½ to 2 lines broad; much compressed, sessile or shortly stipitate, the margin with acute teeth, the terminal tooth commonly the

largest, the sides smooth, or the lower bearing one or more tooth-like projections.

In this genus of homely weeds this species would pass for a not unpleasing plant. The leaves on the virgate branches are much alike in size and form; they are triplenerved and almost as broad as long; the lowest are rarely five lines long. The stem is sometimes absolutely strict, but usually the species is distinguished by its virgate branches. Sometimes the stems bear numerous very short branches which however rob the plant of nothing of its virgate aspect. The inflorescence is androgynous, commonly 3 staminate and 3 to 5 pistillate flowers in the cluster. Collected by the writer Aug. 16, 1892, near Little Oak, Solano County, in saline soil.

A. TRINERVATA. Annual, erect, 2 to 3 feet high: herbage closely and finely mealy-scurfy; leaves 1 to 3 inches long, broadly ovate or deltoid-ovate, irregularly and sharply sinuate-toothed, the lower on stout petioles 9 or 10 lines long and strongly 3-nerved from the base, the upper reduced to sessile floral bracts as broad or broader than long; fruiting bracts sessile in the axils of the leaves, numerous on the branches, orbicular, 2 lines long, $2\frac{1}{2}$ to 3 lines broad, usually emarginate at apex, sharply toothed, partly distinct in the wing, and commonly bearing on one face a few irregular projections or crests.

The specimens were collected in good fruit. The flowers are perhaps more or less unisexual although there are evidences of short terminal staminate spikes. It is distinguishable from *A. argentea*, Nutt., of the Rocky Mts. by its greater size, 3-nerved bracts, distinctly 5-angled, not obscurely 4-angled stem, and by the floral leaves which are deltoid-ovate, not triangular-hastate. Near the Araquipa Hills, Solano County, in low situations, more or less saline, Sept 22, 1891.

A. VERNA. A low annual, only 3 or 4 inches high; the branches simple or nearly so, two or three pairs opposite at base, the upper alternate; the plant loosely scurfy throughout;

leaves oblong-lanceolate or ovate, sessile, 3 to 5 lines long; flowers from the axils of the leafy stems in clusters of two or three; calyx deeply 4-cleft, stamens 4; fruiting bracts orbicular, compressed, 2 lines long, the margins crenate-dentate.

One of the smallest of the genus. It is very likely to be passed over, as the gray-scurfy herbage is of much the same color as the bare saline washes on which the plant grows. The leaves are sessile, and rarely a few of the lowest seven lines long; they are also sometimes sub-cordate at base. The fruiting bracts are large for the size of the plant and are a trifle broader than long. This is a vernal species. My specimens from Collinsville were obtained May 18 of the present year and bore mature fruit.

A. FRUTICULOSA. Perennial, suffrutescent, 4 to 13 inches high; erect, branched from the base, the stems simple below, with terminal branchlets; herbage gray-scurfy; leaves sessile, lanceolate or narrowly oblong, $\frac{1}{4}$ to $\frac{3}{4}$ of an inch long; staminate flowers in dense globose clusters on the terminal branchlets, naked or nearly so; pistillate flowers chiefly below, from the leaf-axils; calyx deeply five cleft, occasionally unequally parted and one lobe reduced; fruiting bracts orbicular, $1\frac{1}{2}$—2 lines broad, the margins partly free, the sides tooth-crested; seed nearly a line broad.

In alkaline soil near Little Oak, Solano Co., Aug. 16. 1892. The plant is an erect, suffrutescent, monœcious perennial characters sufficient to distinguish it from any other *Atriplex* of middle California. The stems are terete. The globose clusters of staminate flowers are in a terminal simple or sometimes slightly branched spike. The only species to which it is at all related is *A. bracteosa* of Watson, first collected on Posé Creek in the region of the upper San Joaquin. That however is an annual, a much larger plant, with thinner and larger leaves, and furrowed stems.

ERRATA.

Page 33, line 26, for out woods, read wet woods.
" 37, " 30, " in, read in which.
" 120, " 21, " so, read as.
" 278, " 20, " admiral, read admirable.
" 280, " 8, " Dr. Scumann, read Dr. Schumann.
" 290, " 26, " infected, read infested.
" 293, " 11, " flower, read flavor.
" 295. Eriogonum Davidsonii E. molestum. Wats. (1882).

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